RETURN TO MAIN MENU

DC-655

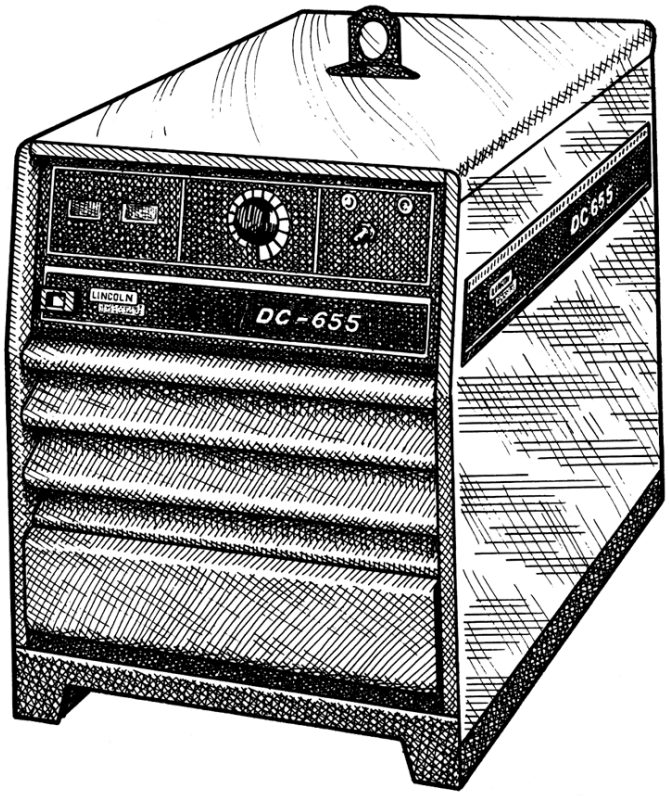
IM602-A

February, 2009

For use with machine Code Number 10501 thru 10510, 11324

Safety Depends on You

Lincoln arc welding and cutting equipment is designed and built with safety in mind. However, your overall safety can be increased by proper installation ... and thoughtful operation on your part. **DO NOT INSTALL, OPERATE OR REPAIR THIS EQUIPMENT WITHOUT READING THIS MANUAL AND THE SAFETY PRECAUTIONS CONTAINED THROUGHOUT.** And, most importantly, think before you act and be careful.



OPERATOR'S MANUAL

ISO 9001

Designed and Manufactured Under a Quality Program Certified by ABS Quality Evaluations, Inc. to ISO 9001 Requirements.
CERTIFICATE NUMBER: 30273

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LINCOLN® ELECTRIC

• World's Leader in Welding and Cutting Products •
• Sales and Service through Subsidiaries and Distributors Worldwide •
Cleveland, Ohio 44117-1199 U.S.A. TEL: 216.481.8100 FAX: 216.486.1751 WEB SITE: www.lincolnelectric.com

⚠ WARNING

⚠ CALIFORNIA PROPOSITION 65 WARNINGS ⚠

Diesel engine exhaust and some of its constituents are known to the State of California to cause cancer, birth defects, and other reproductive harm.

The Above For Diesel Engines

The engine exhaust from this product contains chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

The Above For Gasoline Engines

ARC WELDING CAN BE HAZARDOUS. PROTECT YOURSELF AND OTHERS FROM POSSIBLE SERIOUS INJURY OR DEATH. KEEP CHILDREN AWAY. PACEMAKER WEARERS SHOULD CONSULT WITH THEIR DOCTOR BEFORE OPERATING.

Read and understand the following safety highlights. For additional safety information, it is strongly recommended that you purchase a copy of "Safety in Welding & Cutting - ANSI Standard Z49.1" from the American Welding Society, P.O. Box 351040, Miami, Florida 33135 or CSA Standard W117.2-1974. A Free copy of "Arc Welding Safety" booklet E205 is available from the Lincoln Electric Company, 22801 St. Clair Avenue, Cleveland, Ohio 44117-1199.

BE SURE THAT ALL INSTALLATION, OPERATION, MAINTENANCE AND REPAIR PROCEDURES ARE PERFORMED ONLY BY QUALIFIED INDIVIDUALS.

FOR ENGINE powered equipment.

1.a. Turn the engine off before troubleshooting and maintenance work unless the maintenance work requires it to be running.

1.b. Operate engines in open, well-ventilated areas or vent the engine exhaust fumes outdoors.

1.c. Do not add the fuel near an open flame welding arc or when the engine is running. Stop the engine and allow it to cool before refueling to prevent spilled fuel from vaporizing on contact with hot engine parts and igniting. Do not spill fuel when filling tank. If fuel is spilled, wipe it up and do not start engine until fumes have been eliminated.

1.d. Keep all equipment safety guards, covers and devices in position and in good repair.Keep hands, hair, clothing and tools away from V-belts, gears, fans and all other moving parts when starting, operating or repairing equipment.

1.e. In some cases it may be necessary to remove safety guards to perform required maintenance. Remove guards only when necessary and replace them when the maintenance requiring their removal is complete. Always use the greatest care when working near moving parts.

1.f. Do not put your hands near the engine fan. Do not attempt to override the governor or idler by pushing on the throttle control rods while the engine is running.

1.g. To prevent accidentally starting gasoline engines while turning the engine or welding generator during maintenance work, disconnect the spark plug wires, distributor cap or magneto wire as appropriate.

1.h. To avoid scalding, do not remove the radiator pressure cap when the engine is hot.

ELECTRIC AND MAGNETIC FIELDS may be dangerous

2.a. Electric current flowing through any conductor causes localized Electric and Magnetic Fields (EMF). Welding current creates EMF fields around welding cables and welding machines

2.b. EMF fields may interfere with some pacemakers, and welders having a pacemaker should consult their physician before welding.

2.c. Exposure to EMF fields in welding may have other health effects which are now not known.

2.d. All welders should use the following procedures in order to minimize exposure to EMF fields from the welding circuit:

2.d.1. Route the electrode and work cables together - Secure them with tape when possible.

2.d.2. Never coil the electrode lead around your body.

2.d.3. Do not place your body between the electrode and work cables. If the electrode cable is on your right side, the work cable should also be on your right side.

2.d.4. Connect the work cable to the workpiece as close as possible to the area being welded.

2.d.5. Do not work next to welding power source.

Mar '95

ELECTRIC SHOCK can kill.

3.a. The electrode and work (or ground) circuits are electrically “hot” when the welder is on. Do not touch these “hot” parts with your bare skin or wet clothing. Wear dry, hole-free gloves to insulate hands.

3.b. Insulate yourself from work and ground using dry insulation. Make certain the insulation is large enough to cover your full area of physical contact with work and ground.

In addition to the normal safety precautions, if welding must be performed under electrically hazardous conditions (in damp locations or while wearing wet clothing; on metal structures such as floors, gratings or scaffolds; when in cramped positions such as sitting, kneeling or lying, if there is a high risk of unavoidable or accidental contact with the workpiece or ground) use the following equipment:

- **Semiautomatic DC Constant Voltage (Wire) Welder.**
- **DC Manual (Stick) Welder.**
- **AC Welder with Reduced Voltage Control.**

3.c. In semiautomatic or automatic wire welding, the electrode, electrode reel, welding head, nozzle or semiautomatic welding gun are also electrically “hot”.

3.d. Always be sure the work cable makes a good electrical connection with the metal being welded. The connection should be as close as possible to the area being welded.

3.e. Ground the work or metal to be welded to a good electrical (earth) ground.

3.f. Maintain the electrode holder, work clamp, welding cable and welding machine in good, safe operating condition. Replace damaged insulation.

3.g. Never dip the electrode in water for cooling.

3.h. Never simultaneously touch electrically “hot” parts of electrode holders connected to two welders because voltage between the two can be the total of the open circuit voltage of both welders.

3.i. When working above floor level, use a safety belt to protect yourself from a fall should you get a shock.

3.j. Also see Items 6.c. and 8.

ARC RAYS can burn.

4.a. Use a shield with the proper filter and cover plates to protect your eyes from sparks and the rays of the arc when welding or observing open arc welding. Headshield and filter lens should conform to ANSI Z87. I standards.

4.b. Use suitable clothing made from durable flame-resistant material to protect your skin and that of your helpers from the arc rays.

4.c. Protect other nearby personnel with suitable, non-flammable screening and/or warn them not to watch the arc nor expose themselves to the arc rays or to hot spatter or metal.

FUMES AND GASES can be dangerous.

5.a. Welding may produce fumes and gases hazardous to health. Avoid breathing these fumes and gases. When welding, keep your head out of the fume. Use enough ventilation and/or exhaust at the arc to keep fumes and gases away from the breathing zone. **When welding with electrodes which require special ventilation such as stainless or hard facing (see instructions on container or MSDS) or on lead or cadmium plated steel and other metals or coatings which produce highly toxic fumes, keep exposure as low as possible and within applicable OSHA PEL and ACGIH TLV limits using local exhaust or mechanical ventilation. In confined spaces or in some circumstances, outdoors, a respirator may be required. Additional precautions are also required when welding on galvanized steel.**

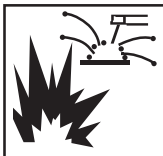
5. b. The operation of welding fume control equipment is affected by various factors including proper use and positioning of the equipment, maintenance of the equipment and the specific welding procedure and application involved. Worker exposure level should be checked upon installation and periodically thereafter to be certain it is within applicable OSHA PEL and ACGIH TLV limits.

5.c. Do not weld in locations near chlorinated hydrocarbon vapors coming from degreasing, cleaning or spraying operations. The heat and rays of the arc can react with solvent vapors to form phosgene, a highly toxic gas, and other irritating products.

5.d. Shielding gases used for arc welding can displace air and cause injury or death. Always use enough ventilation, especially in confined areas, to insure breathing air is safe.

5.e. Read and understand the manufacturer’s instructions for this equipment and the consumables to be used, including the material safety data sheet (MSDS) and follow your employer’s safety practices. MSDS forms are available from your welding distributor or from the manufacturer.

5.f. Also see item 1.b.



WELDING and CUTTING SPARKS can cause fire or explosion.

6.a. Remove fire hazards from the welding area. If this is not possible, cover them to prevent the welding sparks from starting a fire. Remember that welding sparks and hot materials from welding can easily go through small cracks and openings to adjacent areas. Avoid welding near hydraulic lines. Have a fire extinguisher readily available.

6.b. Where compressed gases are to be used at the job site, special precautions should be used to prevent hazardous situations. Refer to "Safety in Welding and Cutting" (ANSI Standard Z49.1) and the operating information for the equipment being used.

6.c. When not welding, make certain no part of the electrode circuit is touching the work or ground. Accidental contact can cause overheating and create a fire hazard.

6.d. Do not heat, cut or weld tanks, drums or containers until the proper steps have been taken to insure that such procedures will not cause flammable or toxic vapors from substances inside. They can cause an explosion even though they have been "cleaned". For information, purchase "Recommended Safe Practices for the Preparation for Welding and Cutting of Containers and Piping That Have Held Hazardous Substances", AWS F4.1 from the American Welding Society (see address above).

6.e. Vent hollow castings or containers before heating, cutting or welding. They may explode.

6.f. Sparks and spatter are thrown from the welding arc. Wear oil free protective garments such as leather gloves, heavy shirt, cuffless trousers, high shoes and a cap over your hair. Wear ear plugs when welding out of position or in confined places. Always wear safety glasses with side shields when in a welding area.

6.g. Connect the work cable to the work as close to the welding area as practical. Work cables connected to the building framework or other locations away from the welding area increase the possibility of the welding current passing through lifting chains, crane cables or other alternate circuits. This can create fire hazards or overheat lifting chains or cables until they fail.

6.h. Also see item 1.c.

6.I. Read and follow NFPA 51B " Standard for Fire Prevention During Welding, Cutting and Other Hot Work", available from NFPA, 1 Batterymarch Park, PO box 9101, Quincy, Ma 022690-9101.

6.j. Do not use a welding power source for pipe thawing.

CYLINDER may explode if damaged.

7.a. Use only compressed gas cylinders containing the correct shielding gas for the process used and properly operating regulators designed for the gas and pressure used. All hoses, fittings, etc. should be suitable for the application and maintained in good condition.

7.b. Always keep cylinders in an upright position securely chained to an undercarriage or fixed support.

7.c. Cylinders should be located:
- Away from areas where they may be struck or subjected to physical damage.
- A safe distance from arc welding or cutting operations and any other source of heat, sparks, or flame.

7.d. Never allow the electrode, electrode holder or any other electrically "hot" parts to touch a cylinder.

7.e. Keep your head and face away from the cylinder valve outlet when opening the cylinder valve.

7.f. Valve protection caps should always be in place and hand tight except when the cylinder is in use or connected for use.

7.g. Read and follow the instructions on compressed gas cylinders, associated equipment, and CGA publication P-l, "Precautions for Safe Handling of Compressed Gases in Cylinders," available from the Compressed Gas Association 1235 Jefferson Davis Highway, Arlington, VA 22202.

FOR ELECTRICALLY powered equipment.

8.a. Turn off input power using the disconnect switch at the fuse box before working on the equipment.

8.b. Install equipment in accordance with the U.S. National Electrical Code, all local codes and the manufacturer's recommendations.

8.c. Ground the equipment in accordance with the U.S. National Electrical Code and the manufacturer's recommendations.

Refer to **http://www.lincolnelectric.com/safety** for additional safety information.

Jan '09

PRÉCAUTIONS DE SÛRETÉ

Pour votre propre protection lire et observer toutes les instructions et les précautions de sûreté specifiques qui parraissent dans ce manuel aussi bien que les précautions de sûreté générales suivantes:

Sûreté Pour Soudage A L'Arc

1. Protegez-vous contre la secousse électrique:

   a. Les circuits à l'électrode et à la piéce sont sous tension quand la machine à souder est en marche. Eviter toujours tout contact entre les parties sous tension et la peau nue ou les vétements mouillés. Porter des gants secs et sans trous pour isoler les mains.
   b. Faire trés attention de bien s'isoler de la masse quand on soude dans des endroits humides, ou sur un plancher metallique ou des grilles metalliques, principalement dans les positions assis ou couché pour lesquelles une grande partie du corps peut être en contact avec la masse.
   c. Maintenir le porte-électrode, la pince de masse, le câble de soudage et la machine à souder en bon et sûr état defonctionnement.
   d. Ne jamais plonger le porte-électrode dans l'eau pour le refroidir.
   e. Ne jamais toucher simultanément les parties sous tension des porte-électrodes connectés à deux machines à souder parce que la tension entre les deux pinces peut être le total de la tension à vide des deux machines.
   f. Si on utilise la machine à souder comme une source de courant pour soudage semi-automatique, ces precautions pour le porte-électrode s'applicuent aussi au pistolet de soudage.

2. Dans le cas de travail au dessus du niveau du sol, se protéger contre les chutes dans le cas ou on recoit un choc. Ne jamais enrouler le câble-électrode autour de n'importe quelle partie du corps.

3. Un coup d'arc peut être plus sévère qu'un coup de soliel, donc:

   a. Utiliser un bon masque avec un verre filtrant approprié ainsi qu'un verre blanc afin de se protéger les yeux du rayonnement de l'arc et des projections quand on soude ou quand on regarde l'arc.
   b. Porter des vêtements convenables afin de protéger la peau de soudeur et des aides contre le rayonnement de l'arc.
   c. Protéger l'autre personnel travaillant à proximité au soudage à l'aide d'écrans appropriés et non-inflammables.

4. Des gouttes de laitier en fusion sont émises de l'arc de soudage. Se protéger avec des vêtements de protection libres de l'huile, tels que les gants en cuir, chemise épaisse, pantalons sans revers, et chaussures montantes.

5. Toujours porter des lunettes de sécurité dans la zone de soudage. Utiliser des lunettes avec écrans lateraux dans les zones où l'on pique le laitier.

6. Eloigner les matériaux inflammables ou les recouvrir afin de prévenir tout risque d'incendie dû aux étincelles.

7. Quand on ne soude pas, poser la pince à une endroit isolé de la masse. Un court-circuit accidental peut provoquer un échauffement et un risque d'incendie.

8. S'assurer que la masse est connectée le plus prés possible de la zone de travail qu'il est pratique de le faire. Si on place la masse sur la charpente de la construction ou d'autres endroits éloignés de la zone de travail, on augmente le risque de voir passer le courant de soudage par les chaines de levage, câbles de grue, ou autres circuits. Cela peut provoquer des risques d'incendie ou d'echauffement des chaines et des câbles jusqu'à ce qu'ils se rompent.

9. Assurer une ventilation suffisante dans la zone de soudage. Ceci est particuliérement important pour le soudage de tôles galvanisées plombées, ou cadmiées ou tout autre métal qui produit des fumeés toxiques.

10. Ne pas souder en présence de vapeurs de chlore provenant d'opérations de dégraissage, nettoyage ou pistolage. La chaleur ou les rayons de l'arc peuvent réagir avec les vapeurs du solvant pour produire du phosgéne (gas fortement toxique) ou autres produits irritants.

11. Pour obtenir de plus amples renseignements sur la sûreté, voir le code "Code for safety in welding and cutting" CSA Standard W 117.2-1974.

PRÉCAUTIONS DE SÛRETÉ POUR LES MACHINES À SOUDER À TRANSFORMATEUR ET À REDRESSEUR

1. Relier à la terre le chassis du poste conformement au code de l'électricité et aux recommendations du fabricant. Le dispositif de montage ou la piece à souder doit être branché à une bonne mise à la terre.

2. Autant que possible, l'installation et l'entretien du poste seront effectués par un électricien qualifié.

3. Avant de faires des travaux à l'interieur de poste, la debrancher à l'interrupteur à la boite de fusibles.

4. Garder tous les couvercles et dispositifs de sûreté à leur place.

Mar. '93

Electromagnetic Compatibility (EMC)

Conformance
Products displaying the CE mark are in conformity with European Community Council Directive of 3 May 1989 on the approximation of the laws of the Member States relating to electromagnetic compatibility (89/336/EEC). It was manufactured in conformity with a national standard that implements a harmonized standard: **EN 60974-10** Electromagnetic Compatibility (EMC) Product Standard for Arc Welding Equipment. It is for use with other Lincoln Electric equipment. It is designed for industrial and professional use.

Introduction
All electrical equipment generates small amounts of electromagnetic emission. Electrical emission may be transmitted through power lines or radiated through space, similar to a radio transmitter. When emissions are received by other equipment, electrical interference may result. Electrical emissions may affect many kinds of electrical equipment; other nearby welding equipment, radio and TV reception, numerical controlled machines, telephone systems, computers, etc. Be aware that interference may result and extra precautions may be required when a welding power source is used in a domestic establishment.

Installation and Use
The user is responsible for installing and using the welding equipment according to the manufacturer's instructions. If electromagnetic disturbances are detected then it shall be the responsibility of the user of the welding equipment to resolve the situation with the technical assistance of the manufacturer. In some cases this remedial action may be as simple as earthing (grounding) the welding circuit, see Note. In other cases it could involve construction of an electromagnetic screen enclosing the power source and the work complete with associated input filters. In all cases electromagnetic disturbances must be reduced to the point where they are no longer troublesome.

Note: The welding circuit may or may not be earthed for safety reasons according to national codes. Changing the earthing arrangements should only be authorized by a person who is competent to access whether the changes will increase the risk of injury, e.g., by allowing parallel welding current return paths which may damage the earth circuits of other equipment.

Assessment of Area
Before installing welding equipment the user shall make an assessment of potential electromagnetic problems in the surrounding area. The following shall be taken into account:

a) other supply cables, control cables, signaling and telephone cables; above, below and adjacent to the welding equipment;

b) radio and television transmitters and receivers;

c) computer and other control equipment;

d) safety critical equipment, e.g., guarding of industrial equipment;

e) the health of the people around, e.g., the use of pacemakers and hearing aids;

f) equipment used for calibration or measurement

g) the immunity of other equipment in the environment. The user shall ensure that other equipment being used in the environment is compatible. This may require additional protection measures;

h) the time of day that welding or other activities are to be carried out.

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Electromagnetic Compatibility (EMC)

The size of the surrounding area to be considered will depend on the structure of the building and other activities that are taking place. The surrounding area may extend beyond the boundaries of the premises.

Methods of Reducing Emissions

Mains Supply
Welding equipment should be connected to the mains supply according to the manufacturer's recommendations. If interference occurs, it may be necessary to take additional precautions such as filtering of the mains supply. Consideration should be given to shielding the supply cable of permanently installed welding equipment, in metallic conduit or equivalent. Shielding should be electrically continuous throughout its length. The shielding should be connected to the welding power source so that good electrical contact is maintained between the conduit and the welding power source enclosure.

Maintenance of the Welding Equipment
The welding equipment should be routinely maintained according to the manufacturer's recommendations. All access and service doors and covers should be closed and properly fastened when the welding equipment is in operation. The welding equipment should not be modified in any way except for those changes and adjustments covered in the manufacturers instructions. In particular, the spark gaps of arc striking and stabilizing devices should be adjusted and maintained according to the manufacturer's recommendations.

Welding Cables
The welding cables should be kept as short as possible and should be positioned close together, running at or close to floor level.

Equipotential Bonding
Bonding of all metallic components in the welding installation and adjacent to it should be considered. However, metallic components bonded to the work piece will increase the risk that the operator could receive a shock by touching these metallic components and the electrode at the same time. The operator should be insulated from all such bonded metallic components.

Earthing of the Workpiece
Where the workpiece is not bonded to earth for electrical safety, not connected to earth because of its size and position, e.g., ships hull or building steelwork, a connection bonding the workpiece to earth may reduce emissions in some, but not all instances. Care should be taken to prevent the earthing of the workpiece increasing the risk of injury to users, or damage to other electrical equipment. Where necessary, the connection of the workpiece to earth should be made by a direct connection to the workpiece, but in some countries where direct connection is not permitted, the bonding should be achieved by suitable capacitance, selected according to national regulations.

Screening and Shielding
Selective screening and shielding of other cables and equipment in the surrounding area may alleviate problems of interference. Screening of the entire welding installation may be considered for special applications. [1]

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[1] Portions of the preceding text are contained in EN 60974-10: "Electromagnetic Compatibility (EMC) product standard for arc welding equipment."

L10093 3-1-96H

Thank You ——— for selecting a **QUALITY** product by Lincoln Electric. We want you to take pride in operating this Lincoln Electric Company product ••• as much pride as we have in bringing this product to you!

CUSTOMER ASSISTANCE POLICY

The business of The Lincoln Electric Company is manufacturing and selling high quality welding equipment, consumables, and cutting equipment. Our challenge is to meet the needs of our customers and to exceed their expectations. On occasion, purchasers may ask Lincoln Electric for advice or information about their use of our products. We respond to our customers based on the best information in our possession at that time. Lincoln Electric is not in a position to warrant or guarantee such advice, and assumes no liability, with respect to such information or advice. We expressly disclaim any warranty of any kind, including any warranty of fitness for any customer's particular purpose, with respect to such information or advice. As a matter of practical consideration, we also cannot assume any responsibility for updating or correcting any such information or advice once it has been given, nor does the provision of information or advice create, expand or alter any warranty with respect to the sale of our products.

Lincoln Electric is a responsive manufacturer, but the selection and use of specific products sold by Lincoln Electric is solely within the control of, and remains the sole responsibility of the customer. Many variables beyond the control of Lincoln Electric affect the results obtained in applying these types of fabrication methods and service requirements.

Subject to Change – This information is accurate to the best of our knowledge at the time of printing. Please refer to www.lincolnelectric.com for any updated information.

Please Examine Carton and Equipment For Damage Immediately

When this equipment is shipped, title passes to the purchaser upon receipt by the carrier. Consequently, Claims for material damaged in shipment must be made by the purchaser against the transportation company at the time the shipment is received.

Please record your equipment identification information below for future reference. This information can be found on your machine nameplate.

Product _____

Model Number _____

Code Number or Date Code_____

Serial Number_____

Date Purchased_____

Where Purchased_____

Whenever you request replacement parts or information on this equipment, always supply the information you have recorded above. The code number is especially important when identifying the correct replacement parts.

On-Line Product Registration

- Register your machine with Lincoln Electric either via fax or over the Internet.
  - For faxing: Complete the form on the back of the warranty statement included in the literature packet accompanying this machine and fax the form per the instructions printed on it.
  - For On-Line Registration: Go to our **WEB SITE at www.lincolnelectric.com.** Choose "Quick Links" and then "Product Registration". Please complete the form and submit your registration.

Read this Operators Manual completely before attempting to use this equipment. Save this manual and keep it handy for quick reference. Pay particular attention to the safety instructions we have provided for your protection. The level of seriousness to be applied to each is explained below:

⚠ WARNING

This statement appears where the information **must** be followed **exactly** to avoid **serious personal injury** or **loss of life**.

⚠ CAUTION

This statement appears where the information **must** be followed to avoid **minor personal injury** or **damage to this equipment**.

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TECHNICAL SPECIFICATIONS – DC-655

INPUT - THREE PHASE ONLY

Standard Volatge	Input Current at Rated Output 100% Duty Cycle	60% Duty Cycle	Code Number
230/460/60	122/61	150/75	10501
230/460/575/60	122/61/49	150/75/60	10502, 11324
208/416/60	135/67.5	166/83	10503
460/60	61	75	10504
575/60	49	60	10505
230/400/50/60*	122/70	150/86	10506
380/500/50/60	74/56	90/69	10507
440/50/60	64	78	10508
200/400/50/60	140/70	172/86	10509
415/50/60	68	83	10510

RATED OUTPUT

Duty Cycle	Amps	Volts at Rated Amperes
100% Duty Cycle NEMA Class I (100)*	650	44
60% Duty Cycle	815	44

OUTPUT

Voltage Range	Current Range	Maximum Open Circuit Voltage	Auxiliary Power
13-44 DC	50-815	46 CV Mode 68 CC Mode	See the OPERATION section for Auxiliary Power information by model

RECOMMENDED INPUT WIRE AND FUSE SIZES

INPUT VOLTAGE / FREQUENCY	HERTZ	INPUT AMPERE RATING ON NAMEPLATE	TYPE 80°C COPPER WIRE IN CONDUIT AWG(IEC-MM²) SIZES 40°C (104°F) Ambient	Copper GROUND WIRE IN CONDUIT AWG(IEC-MM²) SIZES	(SUPER LAG) OR BREAKER SIZE (AMPS)[1]
208	60	135	1 (43)	4 (21)	250 Amp
230	60	122	1 (43)	4 (21)	225 Amp
416	60	67.5	6 (14)	6 (14)	125 Amp
460	60	61	6 (14)	6 (14)	110 Amp
575	60	49	8 (8.4)	8 (8.4)	90 Amp
200	50/60	140	1/0 (54)	4 (21)	250 Amp
230	50/60	122	1 (43)	4 (21)	225 Amp
380	50/60	74	4 (21)	6 (14)	125 Amp
400	50/60	70	4 (21)	6 (14)	125 Amp
415	50/60	68	6 (14)	6 (14)	110 Amp
440	50/60	64	6 (14)	6 (14)	110 Amp
500	50/60	56	6 (14)	6 (14)	110 Amp

PHYSICAL DIMENSIONS

HEIGHT	WIDTH	DEPTH	WEIGHT
27.5 in 699 mm	22.2 in 564 mm	38.0 in 965 mm	720 lbs. 326 kg.

* European models meet IEC974-1 standards.

[1] Also called “inverse time” or “thermal/magnetic” circuit breakers; circuit breakers which have a delay in tripping action that decreases as the magnitude of the current increases.

GRAPHIC SYMBOLS THAT APPEAR ON RATING PLATE (LOCATED ON CASE BACK)

3 Phase transformer with rectified DC output

INPUT POWER

THREE PHASE

NEMA EW 1 (100%)

Designates welder complies with National Electrical Manufacturers Association requirements EW 1 Class I with 100% duty cycle at 650Amps output. (Domestic, Canadian, and Export models)

IEC 974-1

Designates welder complies with International Electrotechnical Commission requirements 974-1. (European Models)

IP-23

Designates the degree of environmental protection provided by the power sources enclosure.

Constant Current Output Characteristics

SMAW

SAW

Constant Voltage Output Characteristics

GMAW

FCAW

Designates welder can be used in environments with increased hazard of electric shock. (European models)

CE

Designates welder complies with low voltage directive and with EMC directive. (European models)

NRTL/C

Designates welder complies with both Underwriters Laboratories (UL) standards and Canadian Standards Association (CSA) standards. (Canadian Model)

NRTL

Designates welder complies with Underwriters Laboratories (UL) standards. (Domestic Models)

U_o Open Circuit Output Voltage

U_1 Input Voltage Rating(s)

I_1 Input Current Rating(s)

X Output Duty Cycle Rating(s)

U_2 Output Voltage Rating(s)

I_2 Output Current Rating(s)

Read entire installation section before starting installation.

SAFETY PRECAUTIONS

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this installation.**
- **Turn the input power OFF at the disconnect switch or fuse box before working on this equipment.**
- **Turn the Power switch on the DC-655 "OFF" before connecting or disconnecting output cables, wire feeder or remote connections, or other equipment.**
- **Do not touch electrically hot parts.**
- **Always connect the Idealarc DC-655 grounding terminal (located on the welder near the reconnect panel) to a good electrical earth ground.**

SELECT SUITABLE LOCATION

Place the welder where clean cooling air can freely circulate in through the front louvers and out through the rear louvers. Dirt, dust or any foreign material that can be drawn into the welder should be kept at a minimum. Failure to observe these precautions can result in excessive operating temperatures and nuisance shut-downs.

STACKING

The DC-655 may be stacked three-high provided the bottom machine is on a stable, hard, level surface. Be sure that the two pins in the roof fit into the slots in the base of the DC-655 above it.

TILTING

Do not place the machine on a surface that is inclined enough to create a risk of the machine falling over.

ELECTROMAGNETIC COMPATIBILITY (EMC)

The EMC classification of the DC-655 is Industrial, Scientific and Medical (ISM) group 2, class A.

The DC-655 is for industrial use only. (See prints L10093-1, -2 safety pages in the Front of Instruction Manual for further details).

Locate the DC-655 away from radio controlled machinery. The normal operation of the DC-655 may adversely affect the operation of RF controlled equipment, which may result in bodily injury or damage to the equipment.

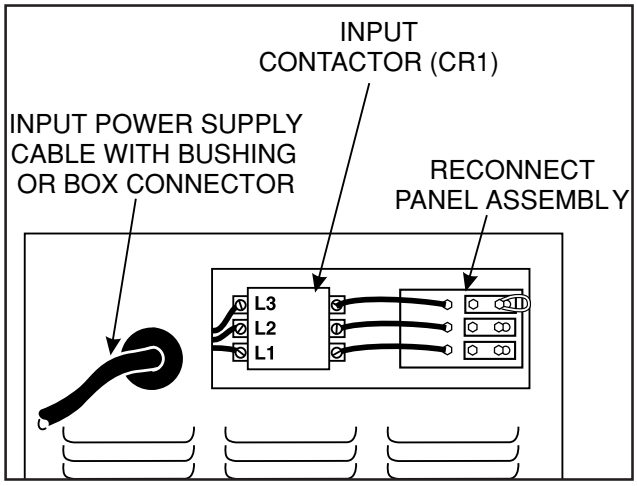


FIGURE A.1 ELECTRICAL INPUT CONNECTIONS

ELECTRICAL INPUT CONNECTIONS

Before installing the machine check that the input supply voltage, phase, and frequency are the same as the voltage, phase, and frequency as specified on the welder nameplate.

Use input wire sizes that meet local electrical codes or see the ***Technical Specifications*** page in this manual.

Input power supply entry is through the hole in the Case Back Assembly. See Figure A.1 for the location of the machine's input cable entry opening, Input Contactor (CR1), and reconnect panel.

FUSE AND WIRE SIZES

Protect the input circuit with the super lag fuses or delay type circuit breakers listed on the ***Technical Specifications*** page of this manual for the machine being used. They are also called inverse time or thermal/magnetic circuit breakers.

DO NOT use fuses or circuit breakers with a lower amp rating than recommended. This can result in "nuisance" tripping caused by inrush current even when machine is not being used for welding at high output currents.

GROUND CONNECTION

Ground the frame of the machine. A ground terminal marked with the symbol (⏚) is located inside the case back of the machine near the input contactor. Access to the input box assembly is at the upper rear of the machine. See your local and national electrical codes for proper grounding methods. Use grounding wire sizes that meet local electrical codes or see the ***Technical Specifications*** page in this manual.

INPUT POWER SUPPLY CONNECTIONS

A qualified electrician should connect the input power supply leads.

1. Follow all national and local electrical codes.
2. Use a three-phase line.
3. Remove the input access door at upper rear of the machine.
4. Follow input supply connection diagram located on the inside the door. For multiple voltage machines, follow the diagram for the voltage that is within 10% of your actual input line voltage.
5. Connect the three-phase AC power supply leads L1, L2, and L3 to the input contactor terminals in the input box assembly. See Figure A.1.

RECONNECT PROCEDURE

⚠ WARNING

Electric Shock Can Kill
- Disconnect input power before performing this procedure.

Multiple voltage machines are shipped connected to the highest input voltage listed on the machine's rating plate. Before installing the machine, check that the reconnect panel in the input box assembly is connected for the proper voltage.

⚠ CAUTION

Failure to follow these instructions can cause immediate failure of components within the machine. When powering welder from a generator be sure to turn off welder first, before generator is shut down in order to prevent damage to welder.

To reconnect a multiple voltage machine to a different voltage, remove input power and refer to the input connection diagram located on the inside of case back input access door. Follow the diagram for the voltage that is within 10% of your actual input line voltage.

1. Figure A.2 shows a sample of the reconnect instructions for a dual voltage machine.

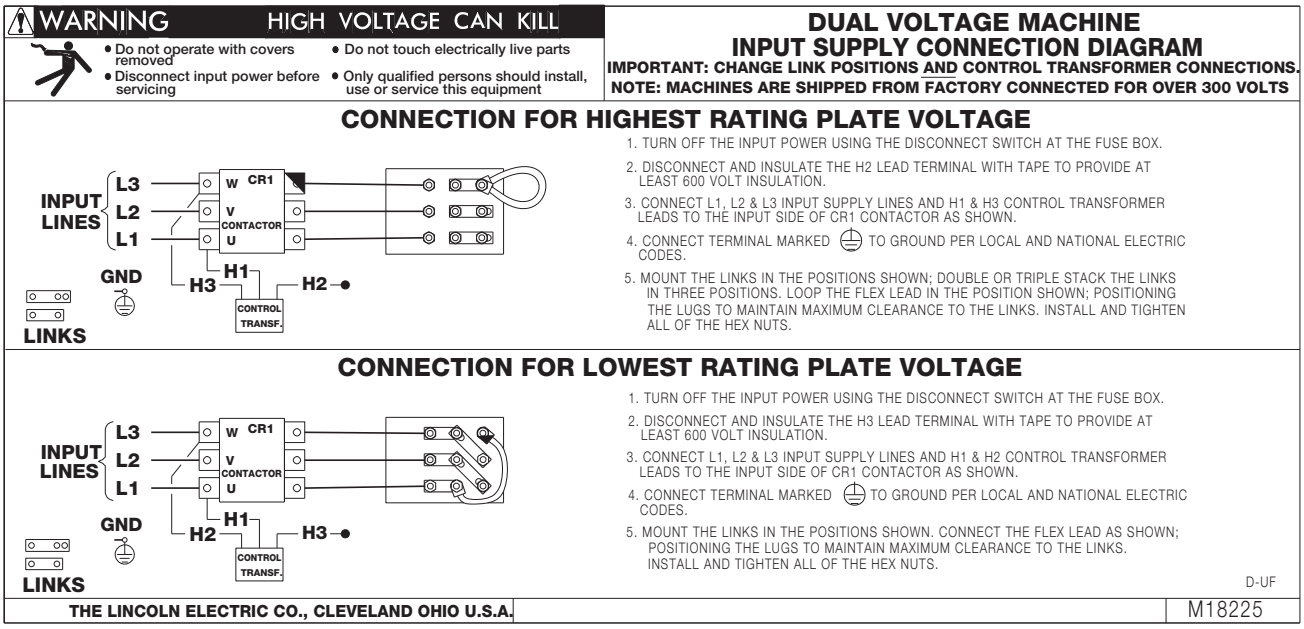

WARNING HIGH VOLTAGE CAN KILL
• Do not operate with covers removed
• Disconnect input power before servicing
• Do not touch electrically live parts
• Only qualified persons should install, use or service this equipment
DUAL VOLTAGE MACHINE
INPUT SUPPLY CONNECTION DIAGRAM
IMPORTANT: CHANGE LINK POSITIONS AND CONTROL TRANSFORMER CONNECTIONS.
NOTE: MACHINES ARE SHIPPED FROM FACTORY CONNECTED FOR OVER 300 VOLTS
CONNECTION FOR HIGHEST RATING PLATE VOLTAGE
INPUT LINES
L3
L2
L1
W CR1
V
CONTACTOR
U
GND
H1
H3
H2
CONTROL TRANSF.
LINKS
1. TURN OFF THE INPUT POWER USING THE DISCONNECT SWITCH AT THE FUSE BOX.
2. DISCONNECT AND INSULATE THE H2 LEAD TERMINAL WITH TAPE TO PROVIDE AT LEAST 600 VOLT INSULATION.
3. CONNECT L1, L2 & L3 INPUT SUPPLY LINES AND H1 & H3 CONTROL TRANSFORMER LEADS TO THE INPUT SIDE OF CR1 CONTACTOR AS SHOWN.
4. CONNECT TERMINAL MARKED ⏚ TO GROUND PER LOCAL AND NATIONAL ELECTRIC CODES.
5. MOUNT THE LINKS IN THE POSITIONS SHOWN; DOUBLE OR TRIPLE STACK THE LINKS IN THREE POSITIONS. LOOP THE FLEX LEAD IN THE POSITION SHOWN; POSITIONING THE LUGS TO MAINTAIN MAXIMUM CLEARANCE TO THE LINKS. INSTALL AND TIGHTEN ALL OF THE HEX NUTS.
CONNECTION FOR LOWEST RATING PLATE VOLTAGE
INPUT LINES
L3
L2
L1
W CR1
V
CONTACTOR
U
GND
H1
H2
H3
CONTROL TRANSF.
LINKS
1. TURN OFF THE INPUT POWER USING THE DISCONNECT SWITCH AT THE FUSE BOX.
2. DISCONNECT AND INSULATE THE H3 LEAD TERMINAL WITH TAPE TO PROVIDE AT LEAST 600 VOLT INSULATION.
3. CONNECT L1, L2 & L3 INPUT SUPPLY LINES AND H1 & H2 CONTROL TRANSFORMER LEADS TO THE INPUT SIDE OF CR1 CONTACTOR AS SHOWN.
4. CONNECT TERMINAL MARKED ⏚ TO GROUND PER LOCAL AND NATIONAL ELECTRIC CODES.
5. MOUNT THE LINKS IN THE POSITIONS SHOWN. CONNECT THE FLEX LEAD AS SHOWN; POSITIONING THE LUGS TO MAINTAIN MAXIMUM CLEARANCE TO THE LINKS. INSTALL AND TIGHTEN ALL OF THE HEX NUTS.
D-UF
THE LINCOLN ELECTRIC CO., CLEVELAND OHIO U.S.A.
M18225

FIGURE A.2 Dual Voltage Machine Reconnection Procedure

OUTPUT CONNECTIONS

ELECTRODE AND WORK CABLES

Use the shortest possible cable lengths. See Table A.1 for recommended cable sizes based on length.

TABLE A.1
Cable Sizes for Combined Lengths of Copper Electrode and Work Cable

Cable Length ft. (m)	Parallel Cables	Cable Size
0 (0) to 100 (30.4)	2	2/0 (70mm²)
100 (30.4) to 200 (60.8)	2	3/0 (95mm²)
200 (60.8) to 250 (76.2)	2	4/0 (120mm²)

The output terminals are located at the lower front of the welder behind a hinged door Refer to figure A.3. Route the welding cables through the slotted strain reliefs of the base to the welding terminals.

LOW INDUCTANCE TERMINAL
On the DC-655, the inside right Negative (-) output terminal is lower choke inductance. This terminal is presently only recommended for CV mode welding with NR203Ni 1% negative polarity procedures. All other processes are to be welded using the outside right Negative (-) output terminal with higher choke inductance. CC mode processes must use high inductance.

For Positive Polarity:

1. Connect the work cable to the high inductance (-) terminal (marked " ").
2. Connect the electrode cable to the positive terminal marked “+”.
3. Remove the terminal strip access cover panel on the lower case front. Refer to figure A.3 for the location.
4. Work Sense lead #21 from the 14 Pin MS-receptacle must be connected to “-21”on the terminal strip. **Note: This is how the DC-655 is shipped from the factory.**
5. Replace the terminal strip access cover panel.

For Negative Polarity:

1. Connect the electrode cable to the appropriate high inductance (-) terminal (marked " ") or to the low inductance (-) terminal (marked " ") if using NR203Ni 1% electrode only.
2. Connect the work cable to the positive terminal marked “+”.
3. Remove the terminal strip access cover panel on the lower case front. Refer to figure A.3 for the location.
4. Work Sense lead #21 from the 14 Pin MS-receptacle must be connected to “+21”on the terminal strip.
5. Replace the terminal strip access cover panel.

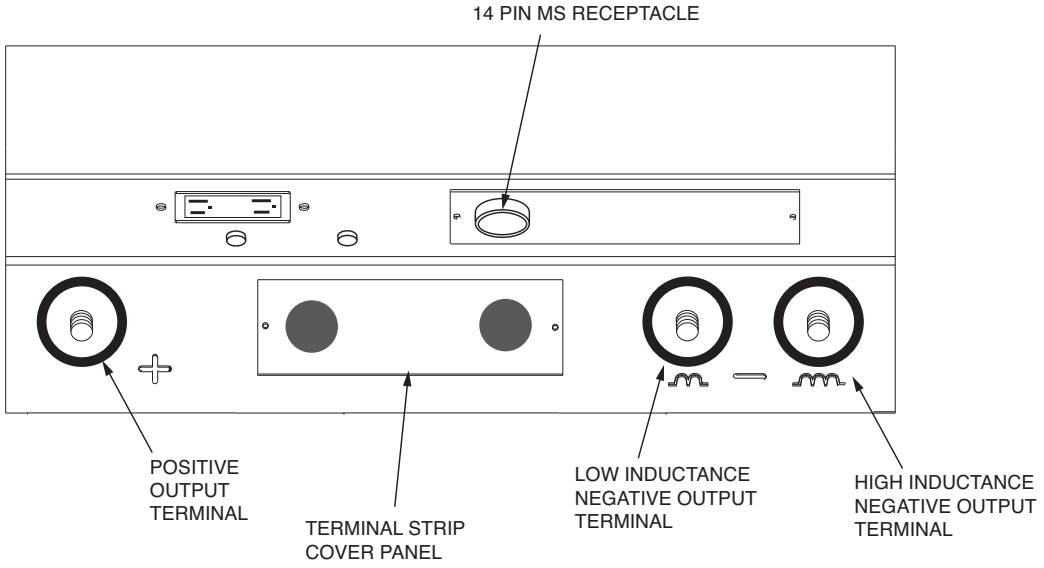

14 PIN MS RECEPTACLE
POSITIVE OUTPUT TERMINAL
TERMINAL STRIP COVER PANEL
LOW INDUCTANCE NEGATIVE OUTPUT TERMINAL
HIGH INDUCTANCE NEGATIVE OUTPUT TERMINAL

FIGURE A.3 Output Connections

AUXILIARY POWER AND CONTROL CONNECTIONS

Located at the lower front of the welder behind a hinged door is a 115VAC duplex receptacle for auxiliary power (Domestic and Canadian Models only) and a 14 Pin MS type receptacle for connection of auxiliary equipment such as wire feeders. Also, terminal strips with 115VAC and connections for auxiliary equipment are located behind the access panel on the lower case of the welder. A 220VAC receptacle for a water cooler (European and Export Models only) is located on the case back.

AUXILIARY POWER TABLE

Voltage and Circuit Breaker Ratings at Auxiliary Power Connections for Various Models

Auxiliary Power Connections	Domestic Models (60Hz)	Canadian Model (230/460/575V/60 Hz)		European Models (50/60 Hz)	Export Models (50/60 Hz)
At Duplex Receptacle	115V 20A	(Code 10502) 115V 15A	(Code 11300) 115V 20A	No Duplex	No Duplex
Terminal strip terminals 31 & 32	115V 20A	115V 15A	115V 20A	115V 15A	115V 15A
MS-Receptacle pins A & J	115V 20A	115V 15A	115V 20A	Open Circuit	115V 15A
MS-Receptacle pins I & K	42V 10A	42V 10A		42V 10A	42V 10A
At 220V Receptacle	No Receptacle	No Receptacle		220V 2A	220V 2A

115VAC DUPLEX RECEPTACLE (DOMESTIC AND CANADIAN MODELS ONLY)

The 115VAC duplex receptacle is protected by a circuit breaker located below the receptacle (see Auxiliary Power Table). Receptacle is a NEMA 5-20R (protected by a 20 amp breaker) on Domestic and Canadian Models, except Canadian Code 10502 receptacle is a NEMA 5-15R, protected by a 15 amp breaker.

220VAC RECEPTACLE (EUROPEAN AND EXPORT MODELS ONLY)

A Continental European receptacle is located on the rear panel for supplying 220VAC to a water cooler. The receptacle has a protective cover to prevent incidently contact and is a Schuko type. The circuit is protected by a 2 amp circuit breaker also located on the rear panel. This circuit is electrically isolated from all other circuits, but on the European Models one line is connected to chassis ground.

14 PIN MS TYPE RECEPTACLE

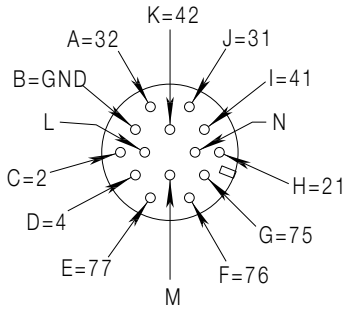
(For MS3106A-20-27PX Plug. L.E.C. Part #S12020-32)

Refer to the figure A.4 for the available circuits in the 14 pin receptacle.

42 VAC is available at receptacle pins I and K. A 10 amp circuit breaker protects this circuit.

115 VAC is available at receptacle pins A and J (Domestic, Canadian and Export Models). This circuit is protected by a circuit breaker (see Auxiliary Power Table). Note that the 42 VAC and 115 VAC circuits are electrically isolated from each other. However, on the European model one line of the 115VAC is connected to chassis ground.

FIGURE A.4 FRONT VIEW OF 14-PIN CONNECTOR RECEPTACLE



PIN	LEAD NO.	FUNCTION
A	32	115 VAC
B	GND	Chassis Connection
C	2	Trigger Circuit
D	4	Trigger Circuit
E	77	Output Control
F	76	Output Control
G	75	Output Control
H	21	Work Sense Connection[2]
I	41	42 VAC
J	31	115 VAC[1]
K	42	42 VAC
L	---	---
M	---	---
N	---	---

[1] 115VAC circuit is not present on IEC 974-1 European models.

[2] As shipped from the factory Lead #21 from the 14 Pin connector is connected to "-21" on the terminal strip. This is the configuration for positive welding. If welding negative polarity, connect lead #21 to the "+21" connection point on the terminal strip.

TERMINAL STRIPS

Terminal strips are available behind the cover panel on the lower case front to connect wire feeder control cables that do not have a 14 Pin MS-type connector. Refer to figure A.3 for the location of this cover panel. These terminals supply the connections as shown in the following Terminal Strip charts. See Auxiliary Power Table for rating of circuit breaker in 115VAC circuit. Remove a plug button from the terminal strip cover and install an appropriate strain relief clamp for the cable being used. NOTE: There are two work sense lead connection points on the terminal strip. Connect both the work sense lead #21 from the 14 pin connector and #21 lead of the control cable to "-21" when welding positive polarity or to "+21" when welding negative polarity.

TERMINAL STRIP 1 (T.S.1)

Lead No.	Function
75	Output Control
76	Output Control
77	Output Control

TERMINAL STRIP 2 (T.S.2)

Lead No.	Function
+21	Work Connection
-21	Work Connection[2]
41	42 VAC
4	Trigger Circuit
2	Trigger Circuit
31	115 VAC[1]
32	115 VAC[1]

[1.] 115VAC circuit is also present on IEC 974-1 European models.

[2.] If connecting a feeder cable directly to the terminal strip, Lead #21 from the cable is connected to "-21" on the terminal strip for positive welding. If welding negative polarity, connect lead #21 to the "+21" connection point on the terminal strip.

SAFETY PRECAUTIONS

Read and understand this entire section before operating the machine.

GENERAL WARNINGS

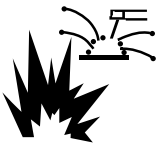
⚠ WARNING

ELECTRIC SHOCK can kill.

- Do not touch electrically live parts or electrode with skin or wet clothing.
- Insulate yourself from work and ground.
- Always wear dry insulating gloves.

FUMES AND GASES can be dangerous.

- Keep your head out of fumes.
- Use ventilation or exhaust to remove fumes from breathing zone.



WELDING SPARKS can cause fire or explosion

- Keep flammable material away.
- Do not weld on containers that have held combustibles.

ARC RAYS can burn.

- Wear eye, ear and body protection.

Observe additional Safety Guidelines detailed throughout this manual.

GENERAL DESCRIPTION

The DC-655 is an energy efficient constant voltage DC power source that produces outstanding arc characteristics for multiple CV or CC welding processes

Four models are available:
Domestic - all 60 Hertz models except 230/460/575v.
NEMA Class 1 rated
Canadian - 230/460/575v 60 Hertz
NEMA Class 1 rated
European - 50/60 Hertz models “CE” qualified and rated for IEC 974-1
Export - 50/60 Hertz models NEMA Class 1 rated

RECOMMENDED PROCESSES AND EQUIPMENT

The DC-655 is designed for CV or CC processes.

CV processes include: GMAW (MIG) and FCAW (flux-cored) welding, plus the capability of CV submerged arc welding and air carbon arc gouging. It produces outstanding welding performance with a single range full output control knob.

CC processes include stick welding, CC submerged arc and superior air carbon arc gouging with up to 3/8” (10 mm) diameter carbons. The same single range full output control knob is used and paralleling capability is provided.

The DC-655 is recommended for use with Lincoln’s DH-10 or LN-10 as well as the LN-7*, LN-7 GMA*,LN-15, LN-742, LN-8*, LN-9*, LN-9 GMA*, LN-23P and LN-25 semiautomatic wire feeders. It is also recommended for use with the NA-3, NA-5 and NA-5R automatic feeders. “Cold starting” for sub-arc or across arc “touch-sensing” can be used.

* The 14-pin MS receptacle on the European models does not provide 115 VAC for these feeders; 115 VAC must be obtained from terminal strip.

Two DC-655’s may be paralleled in a “master” and “slave” interconnection using the K1611-1 Paralleling kit.

DESIGN FEATURES AND ADVANTAGES

- Separate output terminals for selecting high or low inductance as recommended for the welding process.
- Power on/off switch with pilot light and thermostat tripped indicator light.
- Full range output voltage (CV mode) and current (CC mode) control for easy operation.
- Panel switches behind a latched front panel for remote or local output control, output on or remote selection, and CC, CV Sub-arc or CV MIG mode selection.
- Panel knob settable CC arc force control with built-in adjustable “Hot Start”.
- High efficiency output, and selectable “sleep mode” idle mode timer which shuts down input power if not used for extra energy conservation.
- Fan as needed (F.A.N.). Solid state thermally controlled fan operates cooling fan only when required. Minimizes power consumption, operating noise and dust intake.
- Hinged cover to protect output terminals and auxiliary connections.
- Electronic and thermostatic protection for current overload and excessive temperatures.
- 42 VAC, 10 amp auxiliary power available for the wire feeder; circuit breaker protected.
- 115 VAC, auxiliary power protected by a 20 amp breaker available for the wire feeder. Canadian Code 10502, European, and Export Models protected by 15 amp breaker.
- 115 VAC duplex receptacle protected by 20 amp breaker is available on Domestic and Canadian Models, except for Canadian Code 10502 receptacle that is a NEMA 5-15R, protected by a 15 amp breaker.
- 220 VAC receptacle on European and Export models for connecting to a water cooler. Protected by 2 amp breaker.
- Single MS-type (14-pin) connection for wire feeder.
- Optional Field Installed Digital or Analog Voltmeter/Ammeter kits are available.
- Optional dual feeder kit for like polarity connection of two wire feeders. Easy panel installation.
- Optional Dual Process Switch for two processes with polarity change and electrical isolation.

WELDING CAPABILITY

The DC-655 has the following Output and Duty Cycle based on operation for a 10 minute period:

650 Amps, 44 Volts at 100%
815 Amps, 44 Volts at 60%

CONTROLS AND SETTINGS

All operator controls and adjustments are located on the case front of the DC-655. Refer to Figures B.1, and B.2 and corresponding explanations.

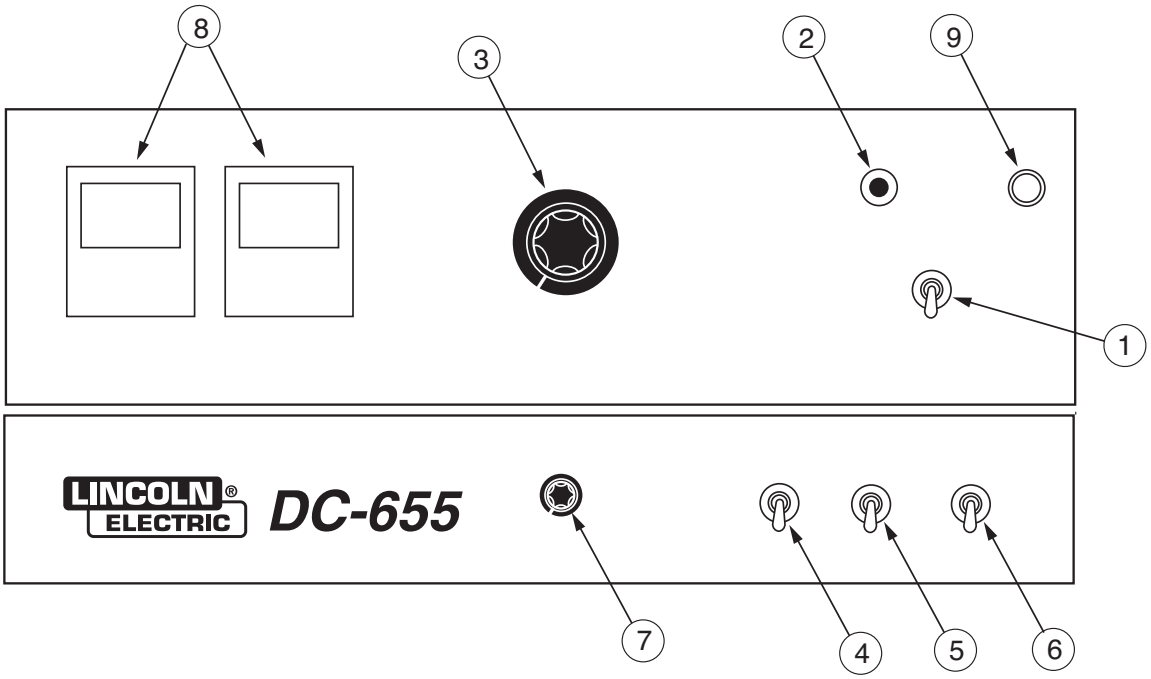


FIGURE B.1 CONTROL PANEL CONTROLS

1. **INPUT POWER ON/OFF SWITCH -** This toggle switch turns the machine on or off. Putting the switch in the ON position energizes the machine's input contactor applying input power to the machine. Switching the switch to the OFF position de-energizes the input contactor. This switch is also used to reset a machine shutdown. (See ***Machine Shutdown section***)

2. **PILOT LIGHT -** When the power switch is in the ON position the machine's white pilot light will illuminate. If the input contactor de-energizes the machine in a shutdown situation the pilot will still illuminate. In this situation it will be necessary to reset the machine by switching the power switch to the OFF then ON position. (See ***Machine Shutdown section***)

3. **OUTPUT CONTROL -** This control provides continuous control of the machine's output from minimum to maximum as it is rotated clockwise. The CV mode voltage range of control is 13 to 44V. The CC mode current range of control is 50 to 815A.

4. **OUTPUT TERMINALS ON/REMOTE -** When this switch is in the REMOTE position, the DC-655's output terminals will be electrically "cold" until a remote device such as a wire feeder closes the #2 and #4 circuit in the MS-receptacle or terminal strip. When this switch is in the ON position the machine's output terminals will be electrically energized all the time.

5. **LOCAL/REMOTE CONTROL SWITCH -** When this switch is set to the LOCAL position, control of the output voltage is via the output control on the DC-655's control panel. When this switch is set to the REMOTE position, control is through a remote source such as a wire feeder via the #75, #76, and #77 leads in the MS-receptacle or terminal strip.

6. **CC STICK/CV SUBARC/CV MIG MODE SWITCH** - This switch selects the proper welding characteristics for the process being used:

   CC Stick provides a constant current output characteristic through the 50 to 815 amp range. The current is adjusted within this range by the Output Control dial. The open circuit (no load) voltage will be about 68 volts in this mode.

This mode is used for stick welding (SMAW) and CC air carbon-arc gouging, and employs a “Hot Start” feature and an Arc Force Control. CC mode may also be used for CC submerged arc with appropriate arc-sensing CC(VV) wire feeders if arc force is set high enough. Refer to ***Welding Performance Section***.

CV MIG provides a constant voltage output characteristic through the 13 to 44 volt range. The voltage is adjusted within this range by the Output Control dial.

The dynamic characteristics of this mode are ideal for open arc processes including, MIG/MAG (GMAW), Innershield®, and other cored wire (FCAW) processes. Faster travel submerged arc processes and CV air carbon-arc gouging may also use this mode. Refer to the ***Welding Performance Section***.

CV Sub-Arc provides the same constant voltage output control range as CV MIG, but the dynamic characteristics of this mode make possible improved CV (constant wire speed) submerged arc welding. This improved process is most noticeable on high deposition slow travel speed welds. Fast travel, narrow bead subarc welds will have better performance in CV MIG mode.

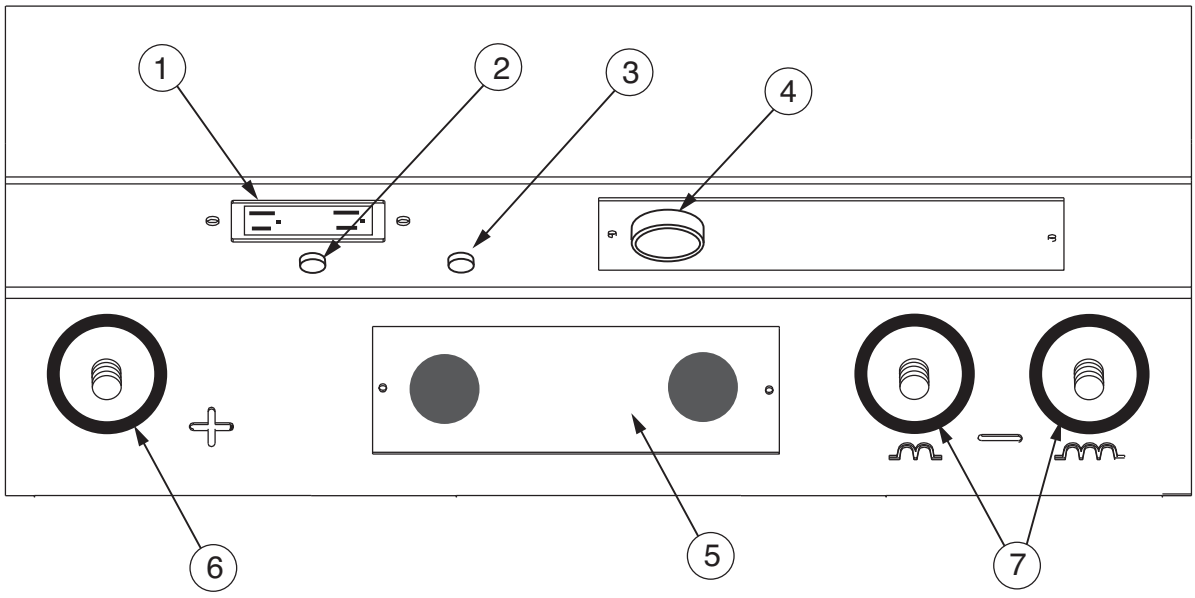
7. ARC FORCE CONTROL - This control is only functional in CC Stick mode. It prevents “stubbing” of the electrode by providing the extra weld current that linearly increases as the welding voltage decreases below a level determined by the setting of the constant current control.

The Arc Force control knob, located behind the latched cover, adjusts arc force from “Min” (no current increase) to “Max” (higher short circuit current). “Mid” position (#5) is recommended for most CC welding. Refer to the ***Welding Performance Section***.

8. OPTIONAL VOLTMETER & AMMETER - Digital or analog meter kits are available as field installed options. Refer to the ***Accessories Section*** of this manual.

9. THERMAL PROTECTION LIGHT - If the machine overheats due to lack of proper air flow through the machine or due to exceeding the machine’s duty cycle, thermostats will disable the welding output and this light will illuminate. Input power is still applied to the machine and the cooling fan will continue to run. When the machine cools the welding output will resume.

FIGURE B.2 LOWER CASE FRONT CONTROLS & CONNECTIONS



1. 115VAC DUPLEX RECEPTACLE (Domestic and Canadian Models) This receptacle provides up to 20 amps of 115 VAC auxiliary power on the Domestic and Canadian Models, except Canadian Model (Code 10502) is 15 amps 115 VAC.

2. 115VAC CIRCUIT BREAKER This breaker protects the 115 VAC auxiliary circuits located in the duplex receptacle, terminal strip and MS- receptacle. Breaker is rated 20 amps on Domestic and Canadian Models, except Canadian Model (Code 10502) and all other models are 15 amps.

3. **42VAC 10 AMP CIRCUIT BREAKER** - This breaker protects the 42VAC auxiliary circuits located in the terminal strip and MS-receptacle.

4. **14 PIN MS-RECEPTACLE -** This connector provides easy connection for a wire feeder control cable. It provides connections for auxiliary power, output switching, remote output control, wire feeder voltmeter sense lead and ground. Refer to ***14 Pin MS Type Receptacle*** in the Installation Section of this manual for information about the circuits made available at this receptacle.

5. **TERMINAL STRIP COVER PANEL -** Remove this panel to gain access to the circuits made available at the terminal strip and the 4-pin receptacle for the optional paralleling kit. This terminal strip contains the same circuits as the 14 pin MS-receptacle. The cover also provides for installation of cable strain relief clamps.

6. **POSITIVE OUTPUT TERMINAL -** This output terminal is for connecting a welding cable. To change welding polarity and for proper welding cable size refer to ***Electrode and Work Cables*** in the Installation Section of this manual.

7. **NEGATIVE OUTPUT TERMINALS -** These output terminals are for connecting a welding cable to either the High Inductance or Low Inductance Terminal for desired arc characteristics. (Low inductance is recommended only for NR203Ni 1%). To change welding polarity and for proper welding cable size refer to ***Electrode and Work Cables*** in the Installation Section of this manual.

CASE BACK CONNECTIONS

220VAC AUXILIARY RECEPTACLE
(European and Export Models)

This receptacle provides up to 2 amps of 220VAC auxiliary power for a water cooler.

220VAC 2 AMP CIRCUIT BREAKER
(European and Export Models)

This breaker protects the 220VAC auxiliary circuit located in the 220VAC receptacle.

AUXILIARY POWER

42 volt AC auxiliary power, as required for some wire feeders, is available through the wire feeder receptacle. A 10 amp circuit breaker protects the 42 volt circuit from overloads.

DC-655 machines can also supply 115 volt AC auxiliary power through the wire feeder receptacle. A 20 amp circuit breaker on the Domestic and Canadian models, except for a 15 amp on Canadian Code 10502 and Export models protects the 115 volt circuit from overloads. 115VAC is not available in the MS-receptacle on the European models.

⚠ CAUTION

Note that some types of equipment, especially pumps and large motors, have starting currents which are significantly higher than their running current. These higher starting currents may cause the circuit breaker to open. If this situation occurs, the user should refrain from using the DC-655 auxiliary power for that equipment.

MACHINE PROTECTION

THERMAL FAN CONTROL

The machine's cooling fan remains off when the temperature of the rectifiers and windings inside the machine are below that requiring air flow cooling, as determined by electronic monitoring of several thermal sensors and the welding current of the machine. The fan may remain off until welding begins, but once the fan is activated, it will remain on for at least 5 minutes to assure proper cooling. This feature saves energy and also minimizes the amount of dirt and other air borne particles being drawn into the machine.

FAN MOTOR FUSE (EUROPEAN MODEL)

A 10 amp slow blow fuse protects the fan motor circuit. This fuse is located inside the DC-655 mounted on the fan motor bracket.

MACHINE SHUTDOWN

The DC-655 provides shutdown modes for thermal over-heating, excessive load currents and faults. It also provides an idle timer shutdown feature for additional operating economy.

THERMAL SHUTDOWN

This welder has thermostatic protection from excessive duty cycles, overloads, loss of cooling, and high ambient temperature. When the welder is subjected to an overload or loss of cooling, a thermostat will open. This condition will be indicated by the illumination of the yellow Thermostatic Protection Light on the case front (see figure B.1). The fan will continue to run to cool the power source. No welding is possible until the machine is allowed to cool and the Thermostatic Protection Light goes out.

OVER CURRENT PROTECTION SHUTDOWN

Average Current Shutdown

To protect the SCR's , the DC-655 will shut down to essentially no output if the output current averages over 900 amps for about 5-6 seconds, and in less than 0.3 seconds if averaging over 1200 amps (shorter time for higher current). Control PC board LED4, shutdown light, will turn on.

This average current shut down can only be reset by opening the feeder gun trigger, or switching the DC-655 Output/Remote switch out of the "on" position.

Peak Current Shutdown

To protect the SCR;s, the DC-655 will shut down immediately to essentially no output if the peak output current exceeds 2500 amps (about 1800A average). Control PC board LED4, shutdown light, will turn on.

This peak current shut down can be reset by turning the DC-655 input power off, then on.

REMOTE CONTROL LEADS FAULT PROTECTION SHUTDOWN

The remote control leads from the 14-pin receptacle or terminal strip are protected against high voltage faults to the electrode circuit or auxiliary voltage supplies. If such a fault occurs the DC-655 will shut down the input primary voltage to the transformer to prevent the fault output. Control PC board LED3, input shutdown light, turns on.

If this input shutdown occurs the input power pilot light remains lit, since the power switch is ON and control power is still present. Welding output or auxiliary supply output will not be present

This input shut down is reset by turning the DC-655 input power off, then on. If the fault is not corrected however, the shutdown will re-occur when turning on the input power.

SHORTED RECTIFIER FAULT PROTECTION

If a short occurs across one of the silicon controlled rectifiers of the DC-655, a potentially hazardous AC voltage could appear across the welding output terminals, even in idle mode when no output should be present. If such a fault occurs the DC-655 will shut down the input primary voltage to the transformer to prevent the fault output. Control PC board LED3, input shutdown light, turns on.

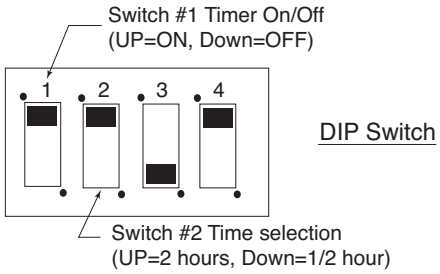
If this input shutdown occurs the input power pilot light remains lit, since the power switch is ON and control power is still present. Welding output or auxiliary supply output will not be present

This input shut down is reset by turning the DC-655 input power off, then on. If the fault is not corrected however, the shutdown will re-occur when turning on the input power.

IDLE SHUT DOWN TIMER

For additional operating economy, the DC-655 can be set up to automatically shut off the primary input power to the main transformer after a selectable time (1/2 or 2 hr.) has expired without welding. The unexpired timer is reset with each weld.

The idle mode timer is activated by setting Switch #1 (left most) of the DIP Switch located on the lower-center of the DC-655 Control PC board. from the down (Off) position to the up (On) position. Setting Switch #2 of the DIP switch to up (On) sets the shutdown time to 2 hours. Setting Switch #2 of the DIP switch to down (Off) sets the shutdown time to 1/2 hour. Shut down is reset by turning the DC-655 input power off, then on.



Note: See Weld Performance section for use of switch #3 and #4.

WELDING PERFORMANCE

LOW INDUCTANCE TERMINAL

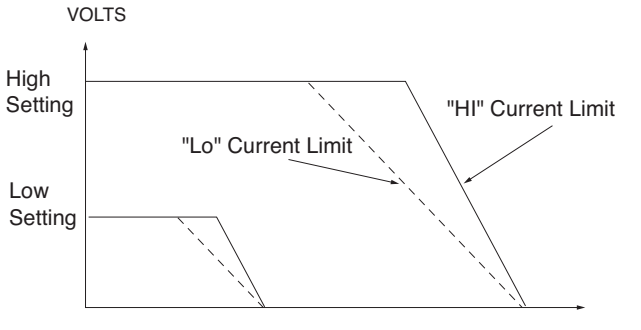
The inside right Negative (-) terminal is lower choke inductance and presently is only recommended for welding with NR203Ni 1% procedures. All other processes are to be welded using the outside right Negative (-) terminal with higher choke inductance.

CV MODE CURRENT-LIMITING

CV MIG and CV Sub-Arc modes employ electronic current limiting to limit excessive short circuit output current which can result in undesirable arc characteristics or nuisance over current protection shutdown (see ***Machine Protection*** section).

As shipped, the DC-655 is set for “Hi” current limiting, which maintains constant voltage until the welding current exceeds a level proportional to the voltage setting, then falls off linearly at about 10 volts per 100 amps to a limited short circuit current. “Lo” current limiting provides the same short circuit current, but the arc voltage begins to linearly fall off at lower current, at about 5 volts per 100 amps.

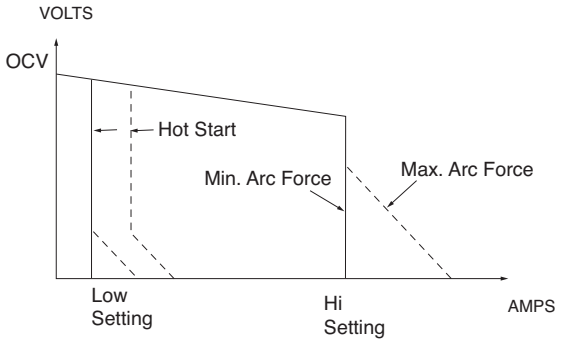
“Hi” is recommended for all CV processes, especially for CV subarc and CV arc gouging, but “Lo” tends to “soften” the arc more when welding NR203Ni 1% on the Low Inductance (-) terminal. If “Lo” is desired, switch #4(right-most) of the DIP switch located on the lower-center of the DC-655 Control PC board needs to be switched from up (Hi) position to down (Lo) position.



CV OUTPUT

CC MODE ARC FORCE

Arc Force provides extra weld current which linearly increases as the welding voltage decreases below a level determined by the constant current setting. The Arc Force control knob, located behind the latched cover, adjust Arc Force from “Min” (no current increase) to “Max” (about 9A/V increase).



CC OUTPUT

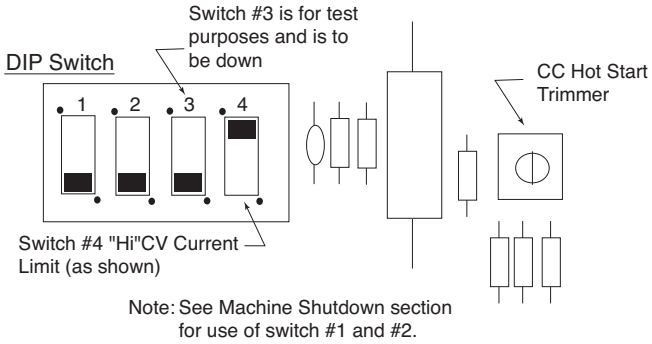
A general guideline for CC welding is to set Arc Force to “Mid” position (#5) and increase (typically no more than to #7) as necessary to prevent “stubbing” or “pop-outs” while welding. This higher Arc Force is reccommended especially for low end 6010 stick welding.

CC MODE HOT START

Hot start is built-in for CC mode stick and carbon arc starting. Hot Start provides an extra weld current “boost” at the arc strike which increases with higher current settings. This Hot Start level exponentially decays to the weld current setting in a few seconds.

Adjustment of the Hot Start shouldn’t be necessary, but an unsealed trimmer (R81) is provided on the DC-655 Control PC Board to adjust hot start. Full counterclockwise adjustment will reduce Hot Start to zero

CC MODE ARC GOUGING


Switch #3 is for test purposes and is to be down
DIP Switch
1
2
3
4
CC Hot Start Trimmer
Switch #4 "Hi"CV Current Limit (as shown)
Note: See Machine Shutdown section for use of switch #1 and #2.

DC-655 Control PC Board

The DC-655 is rated for air carbon arc gouging with up to 3/8” (10mm) diameter carbons. CC mode gouging is often preferred over CV mode for cutting control, but some Arc Force may be required to avoid carbon stubbing.

The DC-655 can be used to power any of the following Lincoln Wire feeders:

SEMI-AUTOMATIC WIRE FEEDERS

- LN-15
- DH-10
- LN-10
- LN-7 GMA*
- LN-742
- LN-7*
- LN-9*
- LN-9 GMA*
- LN-23P
- LN-25
- LN-8*

AUTOMATIC WIRE FEEDERS*

- NA-3
- NA-5
- NA-5R
- LT-7 Tractor

* European DC-655 models only provide 115VAC for these feeders at the terminal strip (TS2)

FIELD INSTALLED OPTIONS

K1482-1 Digital Ammeter/Voltmeter Kit - Installs easily to the front control panel and provides digital display of actual welding voltage and amperage while welding. (Installation instructions are included with the kit).

K1483-1 Analog Ammeter/Voltmeter Kit - Installs easily to the front control panel and provides analog display of actual welding voltage and amperage while welding. (Installation instructions are included with the kit).

K1484-1 Dual Feeder Kit - This kit replaces the 14 Pin MS-receptacle panel on the lower case front of the DC-655. It provides two 14 Pin MS-receptacles and a built in transfer circuit for connecting and operating two like-polarity wire feeders. European DC-655 models can only use 42V feeders with this kit. (Installation instructions are included with the kit).

K1485-1 Cable Hanger Bracket - Mounts over standard lift bale of the DC-655 and provides a cable hanger on both sides of the power source, each side capable of holding up to 100 ft. of weld cable. (Installation instructions are included with the kit).

K1486-1 Air Filter Kit - Removable metal filter easily slides in and out of a bracket which mounts to the front of the DC-655. Filter is designed to trap 80% of entering particles which are 5 microns, or larger, in size. (Installation instructions are included with the kit). Cannot be used with K1528-1 Dual process switch.

NOTE: A dirty air filter may cause the thermal protection of the DC-655 to prematurely activate. Remove and blow out, or wash and dry, the filter every two months, or less if in extremely dirty conditions. Replace if necessary.

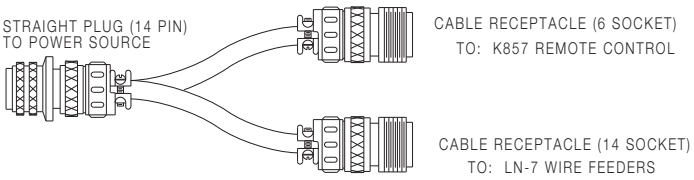
Undercarriage (K817P, K842) - The DC-655 is designed for use with the Lincoln K817P or K842 Undercarriage. Complete installation instructions are included with each undercarriage. When any of the undercarriages are installed, the DC-655 lift bail is no longer functional. Do not attempt to lift the machine with the undercarriage attached. The undercarriage is designed for moving the machine by hand only. Mechanized towing can lead to injury and /or damage to the DC-655.

REMOTE OUTPUT CONTROL (K775 or K857 WITH K864 ADAPTER)

An optional “remote output control” is available. This is the same remote control that is used on other Lincoln power sources (K775). The K775 consists of a control box with 28 ft (8.5m) of four conductor cable. This connects to terminals 75, 76, and 77 on the terminal strip and the case grounding screw so marked with the symbol ⏚ on the machine. These terminals are located behind the cover panel on the lower connection panel of the DC-655. This control will give the same control as the output control on the machine.

The K857 has a 6-pin MS-style connector. The K857 requires a K864 adapter cable which connects to the 14-pin connector on the DC-655.

REMOTE CONTROL ADAPTER CABLE (K864)



A “V” cable 12” (.30m) long to connect a K857 Remote Control (6 pin connector) with a wire-feeder (14-pin connector) and the machine (14-pin connector). If a remote control is used alone the wire-feeder connection is then not used.

K1528-1 Dual Process Switch - (Cannot be used with K1486-1 Air Filter Kit) The Dual-Process Switch mounts easily to the front of the machine and is designed to provide a selection between left and right side output terminals. Each pair of output terminals can be switched to either the DC-655, high or low inductance terminals as desired. Wire feed unit cables and air carbon arc cables can be connected to either or both sides of the box and with proper connection can provide polarity change with just a switch change. Selecting one side only energizes those output studs and opens the other side. Installation instructions are included with the switch.)

K1611-1 Paralleling Kit - Provides interconnection of two DC-655 machines in parallel for doubling the current capacity of one machine. This “master” and “slave” connection configuration allows the “master” to control the balanced output of both machines. Individual protection circuits of both machines function normally. (Installation instructions are included with the switch.)

SAFETY PRECAUTIONS

⚠ WARNING

ELECTRIC SHOCK can kill.

- **Only qualified personnel should perform this maintenance.**
- **Turn the input power OFF at the disconnect switch or fuse box before working on this equipment.**
- **Do not touch electrically hot parts.**

GENERAL MAINTENANCE

1. The fan motor has sealed bearings which require no service.

2. In extremely dusty locations, dirt may restrict the cooling air causing the welder to run hot with premature tripping of thermal protection. Blow out the welder with low pressure air at regular intervals to eliminate excessive dirt and dust build-up on internal parts.

3. Periodically check the welding cables. Inspect for any slits or punctures. Also make sure that all connections are tight.

HOW TO USE TROUBLESHOOTING GUIDE

⚠ WARNING

Service and Repair should only be performed by Lincoln Electric Factory Trained Personnel. Unauthorized repairs performed on this equipment may result in danger to the technician and machine operator and will invalidate your factory warranty. For your safety and to avoid Electrical Shock, please observe all safety notes and precautions detailed throughout this manual.

This Troubleshooting Guide is provided to help you locate and repair possible machine malfunctions. Simply follow the three-step procedure listed below.

Step 1. LOCATE PROBLEM (SYMPTOM).
Look under the column labeled "PROBLEM (SYMPTOMS)". This column describes possible symptoms that the machine may exhibit. Find the listing that best describes the symptom that the machine is exhibiting.

Step 2. POSSIBLE CAUSE.
The second column labeled "POSSIBLE CAUSE" lists the obvious external possibilities that may contribute to the machine symptom.

Step 3. RECOMMENDED COURSE OF ACTION
This column provides a course of action for the Possible Cause, generally it states to contact your local Lincoln Authorized Field Service Facility.

If you do not understand or are unable to perform the Recommended Course of Action safely, contact your local Lincoln Authorized Field Service Facility.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

TROUBLESHOOTING

E-2

Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
PROBLEMS		
Input contactor (CR1) chatters.	1. Faulty input contactor (CR1). 2. Low line voltage.	Contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance.
Machine input contactor does not operate.	<u>If Power Pilot light is off:</u> 1. Make sure the proper three-phase input power is applied to the DC-655 machine. 2. The power switch (SW1) may be faulty. 3. The pilot transformer may be faulty. <u>If Power Pilot light is on:</u> 1. The input contactor may be faulty. 2. Input shutdown may be activated (LED3 on on Control Board). See ***Shorted Rectifier Fault Protection*** in Operation Section.	
Machine input contactor operates, but no output when trying to weld.	1. Electrode or work cables may be loose or broken. 2. Firing P.C. board is not connected or is faulty. See PC board LED information. 3. Trigger circuit may not be working. Place Output Terminals Switch to the ON position, or place a jumper wire across #2 and #4 on the terminal strip. If output is enabled then check control cable to feeder if connected. 4. If the thermal protection light is ON the machine is overheated. Make sure the fan is operating and remove the cause of the overheating problem.	

⚠ CAUTION

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Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
PROBLEMS		
Machine has output, but no control.	1. Check the Local/Remote output switch (SW3) and associated leads. See wiring diagram. 2. Make sure the remote control leads #75, #76 and /or #77 are NOT grounded to either welding output. 3. Make sure control cable to feeder (if used) is connected properly. 4. The output control potentiometer may be faulty. 5. Control board transformer may be faulty 6. The control or firing board may be faulty.	Contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance.
Machine does not have maximum output.	1. Make sure the correct three-phase input is applied to the DC-655 machine. 2. The output control potentiometer may be faulty. 3. The control or firing board may be faulty.	
Poor arc striking with semiautomatic or automatic wire feeders.	1. Make sure the mode switch is in the proper position for the process. 2. Make sure the welding cables and connections are secure. 3. Check for correct welding procedures.	

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
PROBLEMS		
Variable or sluggish welding arc.	1. Make sure the mode switch is in the proper position for the process. 2. Make sure the welding cables are sized correctly and the connections are tight. 3. Make sure the welding procedures are correct.	Contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance.
Output Control Pot not functioning in "Local" control only.	1. Check the Local/Remote control switch and associated leads. See wiring diagram. 2. The machine output control potentiometer may be faulty. Also check associated leads. See wiring diagram.	
No output control in "Remote" control only.	1. Output Control Switch in wrong position. 2. Faulty Output Control Switch. 3. Faulty Remote Control Pot. 4. Leads or connections open in control circuit. (#75, #76, #77)	

⚠ CAUTION

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Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
PROBLEMS		
Machine will not weld. OCV is less than 1 volt.	1. The machine may be in a overload condition. Refer to ***Machine Protection*** in the operation section. 2. See the PC board LED information.	
The wire feeder will not come on.	1. Either the 42VAC or the 115VAC circuit breakers may be tripped. Reset if necessary. 2. Check for the presence of the required voltage to operate the wire feeder. 3. The control cable or wire feeder may be faulty.	Contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance.

⚠ CAUTION

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Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
PROBLEMS		
Poor arc characteristics.	1. The negative welding cable may be connected to the wrong inductance tap. 2. Make sure the mode switch is in the proper position for the process. 3. The control board may be faulty. See PC board LED information.	
115VAC receptacle not working.	1. Check the 115VAC circuit breaker. Reset if necessary. Make sure the load on the receptacle does not exceed the rating of the 115VAC breaker. See wiring diagram.	Contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance.

⚠ CAUTION

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Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
PROBLEMS		
Thermal Protection Light comes ON and fan does not run. **NOTE:** Fan is thermal controlled and does not continuously run when machine is powered up.	1. Check for obstructions that could prevent the fan from turning. 2. Check the fan control circuit. See wiring diagram. 3. The fan motor may be faulty. 4. The Thermal Fan/Snubber PC board may be faulty. See PC board LED information.	Contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance.
Fan runs continuously.	1. The Thermal Fan Thermistor may be faulty. See wiring diagram. 2. The Thermal Fan/Snubber PC board may be faulty. See PC board LED information.	
One or both Digital Meters not lighting.	1. The meters may not be receiving the voltages from the auxiliary transformer. Check plug P13. See wiring diagram. 2. The Digital meter PC board may be faulty.	
Digital Voltmeter not working properly or erratic display.	1. Meter may not be receiving auxiliary or sensing voltages. Make sure plug P12 & P13 are securely plugged into the Digital meter PC board and also plug P3 is securely plugged into the control board. 2. The may be an open in the voltage feedback circuit. See wiring diagram. 3. The Digital meter PC board may be faulty.	

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

Observe all Safety Guidelines detailed throughout this manual

PROBLEMS (SYMPTOMS)	POSSIBLE CAUSE	RECOMMENDED COURSE OF ACTION
PROBLEMS		
Digital Ammeter not working properly or erratic display.	1. The meter PC board may not be receiving the auxiliary or sensing voltages. Check plug P3 and plugs P12 & P13. See wiring diagram. 2. The current feedback circuit may be faulty. From the shunt to the control board. See wiring diagram. 3. The Digital meter PC board may be faulty.	Contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance.
Analog Meters not reading, or not reading correctly.	1. The meters may not be receiving voltage or current feedback signals. Make sure plug P3 is securely plugged in the control board and plug J14 (in-line connector) is securely seated in the plug assembly from the control board. 2. Check the current feedback and voltage feedback circuits. See wiring diagram. 3. The meter(s) may be defective.	
220VAC receptacle not working. (50/60 Hz Europe and Export models only)	1. Check the circuit breaker. Reset if necessary. 2. Check for broken or loose connections in the 220VAC circuit. See wiring diagram.	

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

Observe all Safety Guidelines detailed throughout this manual

PC BOARD TROUBLESHOOTING GUIDE - FIRING P.C. BOARD

1. All 10 LED's must be ON when the POWER SOURCE is turned ON and the wire feeder's trigger is closed, or a jumper is placed between 2 & 4, or the "OUTPUT TERMINALS SWITCH" is in the ON position.
2. LED's 7, 8, and 9 indicate AC power being supplied to the P.C. board from auxiliary windings (T1). If a light is not on, turn the machine off and unplug P5 from the firing board. Turn the machine back on and check the following voltages:

Light that was off	Check AC voltage between	Voltage should be approximately
7	P5 pins 15 & 16 (wires 230,204)	32VAC
8	P5 pins 7 & 8 (wires 205,206)	32VAC
9	P5 pins 5 & 6 (wires 207,208)	32VAC

3. If all voltages are present, turn power off, and plug P5 back into J5. Turn power back on. If LED's are still out, replace firing PCB.
4. If voltages were not present then check the wiring back to the auxiliary windings for a possible open.
5. LED's 1 through 6 indicate gate signals are being sent to the main SCR's 1 through 6 respectively If LED5 is on (CONTROL BOARD), along with LED7, 8, and 9 on firing PCB, and LED's 1 through 6 are not on, check to make sure lead 231 between control board and firing board is not broken.
6. If any one of LED 1 through 6 are not on and LED's 7,8, and 9 are on, replace the firing PCB.

PC BOARD TROUBLESHOOTING GUIDE - CONTROL P.C. BOARD

1. LED1 indicates that the CC mode switch is closed. When the CC mode switch closed LED6 should also illuminate. See LED6.
2. LED2 indicates that there is feedback voltage present in CV mode.
3. LED3 indicate an input shutdown. Refer to ***Remote Control Leads Fault Protection Shutdown*** and ***Shorted Rectifier Fault Protection*** or ***Idle Shut Down Timer*** in the Operation section.
4. LED4 indicates an over current fault shutdown. Refer to ***Overcurrent Protection Shutdown*** in the Operation Section.
5. LED5 Indicates Output Current should be present.
6. LED6 indicates that the machine is in CC mode. This LED should light whenever LED1 lights. If not the Control PC Board may be faulty.
7. LED7 +16V power supply
8. LED8 indicates the Control PC Board is signalling the Firing PC Board to fire the SCRs.
9. LED9 -10V power supply
10. LED10 indicates that 42V input is present to the Control PC Board
11. LED11 indicates that there is feedback voltage present in CC mode.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

Observe all Safety Guidelines detailed throughout this manual

PC BOARD TROUBLESHOOTING GUIDE - THERMAL FAN/ SNUBBER P.C. BOARD

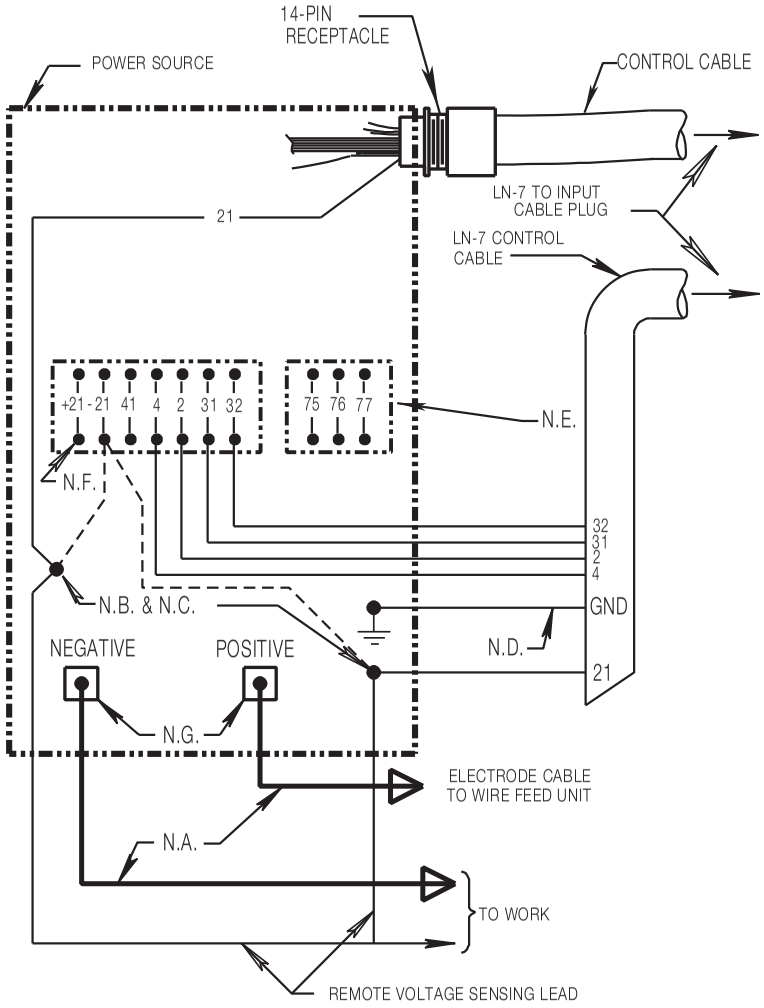
NOTE: Fan will run for minimum of 5 minutes once fan turns on.

1. LED1 when ON indicates fan should be running. If ON and machine is cold, replace PCB.
2. LED2 when ON indicates welding current greater than 50 amps. If ON and not drawing more than 40 amps, replace PCB.
3. LED3 when ON indicates Main SCR'S need cooling and turns fan ON. If ON and machine is cold, replace PCB.
4. LED4 when ON indicates an open Thermal Fan Thermistor, or open connection to PCB. Fan will run constantly. Check Thermal Fan Thermistor for an open. If open replace. If not open Replace PCB.
5. LED5 when ON indicates an open thermostat. Thermal Protection light should also be ON. If Thermal Protection light is not ON, and LED5 is ON, replace PCB.
6. LED6 when ON indicates fan should be running. LED6 will be ON whenever LED's 2, 3 4 or 5 is ON. If LED's 2, 3, 4, or 5 are not ON when LED6 is ON, replace PCB.

⚠ CAUTION

If for any reason you do not understand the test procedures or are unable to perform the tests/repairs safely, contact your **Local Lincoln Authorized Field Service Facility** for technical troubleshooting assistance before you proceed.

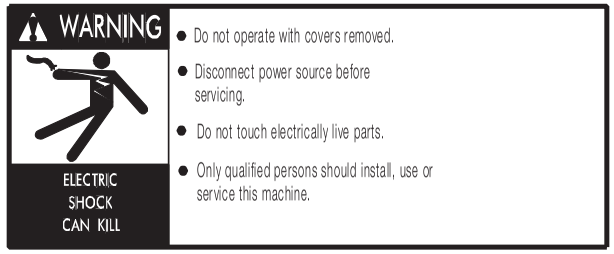
CONNECTION OF LN-7 TO THE CV-655, DC-655 OR DC-600 POWER SOURCE



FOR CONTROL CABLE WITH 14 PIN MS-TYPE PLUG CONNECTOR

OR

FOR CONTROL CABLE WITH TERMINAL STRIP LEAD CONNECTORS


WARNING
ELECTRIC SHOCK CAN KILL
Do not operate with covers removed.
Disconnect power source before servicing.
Do not touch electrically live parts.
Only qualified persons should install, use or service this machine.

N.A. Welding cables must be of proper capacity for the current and duty cycle of immediate and future applications. See LN-7 Operating Manual for proper sizes.

N.B. If LN-7 is equipped with a meter kit, extend LN-7 control cable lead #21 from control cable with terminal strip connectors or from 14-pin receptacle using #14 AWG or larger insulated wire physically suitable for the installation. An S16586-[LENGTH] remote voltage sensing work lead may be ordered for this purpose. Connect it directly to the work piece independent of the welding work cable connection. For convenience, this extended #21 lead should be taped to the welding work lead. (If the length of welding work cable is short, less than 25 feet, and connections can be expected to be reliable, then control cable lead #21 does not need to be extended and can be directly connected to terminal #21 on the terminal strip. Note that this is not the preferred connection because it adds error to the LN-7 voltmeter reading.)

N.C. Tape up bolted connection if lead #21 is extended.

N.D. Connect the control cable ground lead to the frame terminal marked ⏚ near the power source terminal strip. The power source grounding terminal (marked ⏚ and located near the power source input power connections) must be properly connected to electrical ground per the power source operating manual.

N.E. If an optional remote voltage control is used, connect it to this terminal strip.

N.F. If lead #21 is to be connected to the terminal strip, connect to the #21 terminal that matches work polarity. This connection must be changed whenever the electrode polarity is changed.

N.G. Illustration does not necessarily represent actual position of appropriate output studs. Refer to power source operating manual for more information.

Above diagram shows electrode connected positive. To change polarity, turn power off, reverse the electrode and work leads at the power source and position the switch on wire feeder (if equipped) to proper polarity. Also refer to note N.F.

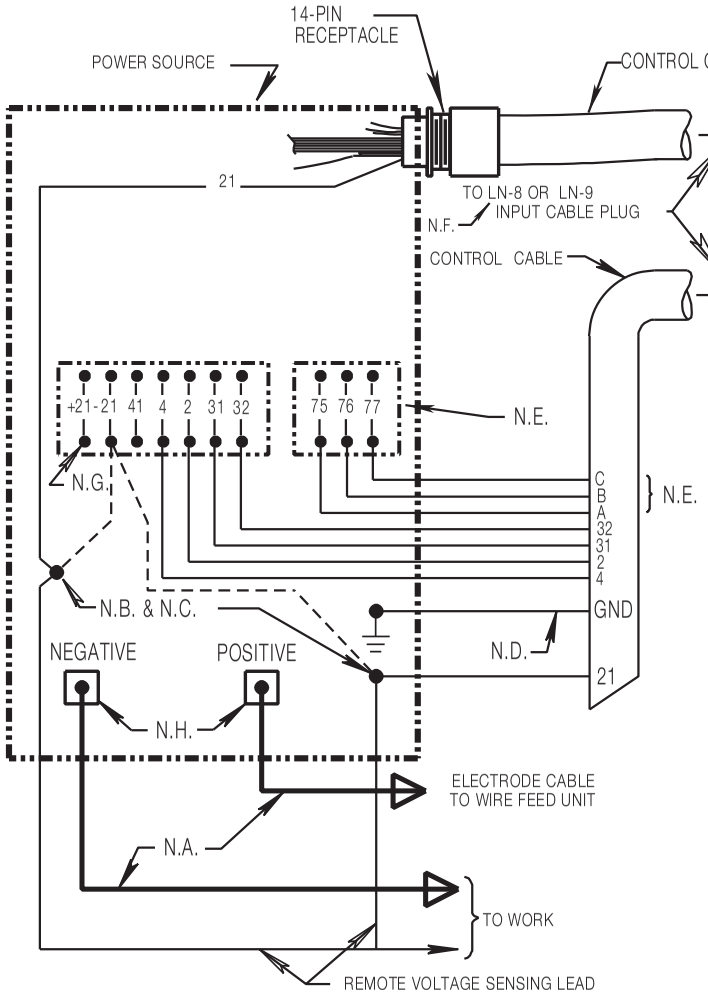
For proper setting of switches on power source, see power source operating manual.

10-30-98F

S22976

DC-655 LINCOLN ELECTRIC

CONNECTION OF LN-8 OR LN-9 TO THE CV-655, DC-655 OR DC-600 POWER SOURCE



FOR CONTROL CABLE WITH 14 PIN MS-TYPE PLUG CONNECTOR

OR

FOR CONTROL CABLE WITH TERMINAL STRIP LEAD CONNECTORS

WARNING

ELECTRIC SHOCK CAN KILL

- Do not operate with covers removed.
- Disconnect power source before servicing.
- Do not touch electrically live parts.
- Only qualified persons should install, use or service this machine.

N.A. Welding cables must be of proper capacity for the current and duty cycle of immediate and future applications.

N.B. Extend lead #21 from control cable with terminal strip connectors or from 14-pin receptacle using #14 AWG or larger insulated wire physically suitable for the installation. An S16586-[LENGTH] remote voltage sensing work lead may be ordered for this purpose. Connect it directly to the work piece keeping it electrically separate from the welding work lead circuit and connection. For convenience, this extended #21 lead should be taped to the welding work lead. (If the length of work lead circuit is short, and connections can be expected to be reliable, then control cable lead #21 does not need to be extended and can be directly connected to terminal #21 on the terminal strip. Note that this is not the preferred connection because it adds error to the wire feeder voltmeter reading.)

N.C. Tape up bolted connection if lead #21 is extended.

N.D. Connect the control cable ground lead to the frame terminal marked ⏚ near the power source terminal strip. The power source grounding terminal (marked ⏚ and located near the power source input power connections) must be properly connected to electrical ground per the power source operating manual.

N.E. If using an older LN-8 control cable: connect lead #75 to #75 on terminal strip, connect lead #76 to #76 on terminal strip, connect lead #77 to #77 on the terminal strip.

N.F. The LN-9 voltage control jumpers must be connected as follows (refer to LN-9 Operating Manual):
White jumper on voltage board to pin "S" .
Blue jumper on voltage board (later units only), or on start board (earlier units), to pin "B".

N.G. If lead #21 is to be connected to the terminal strip, connect to the #21 terminal that matches work polarity. This connection must be changed whenever the electrode polarity is changed.

N.H. Illustration does not necessarily represent actual position of appropriate output studs. Refer to power source instruction manual for more info.

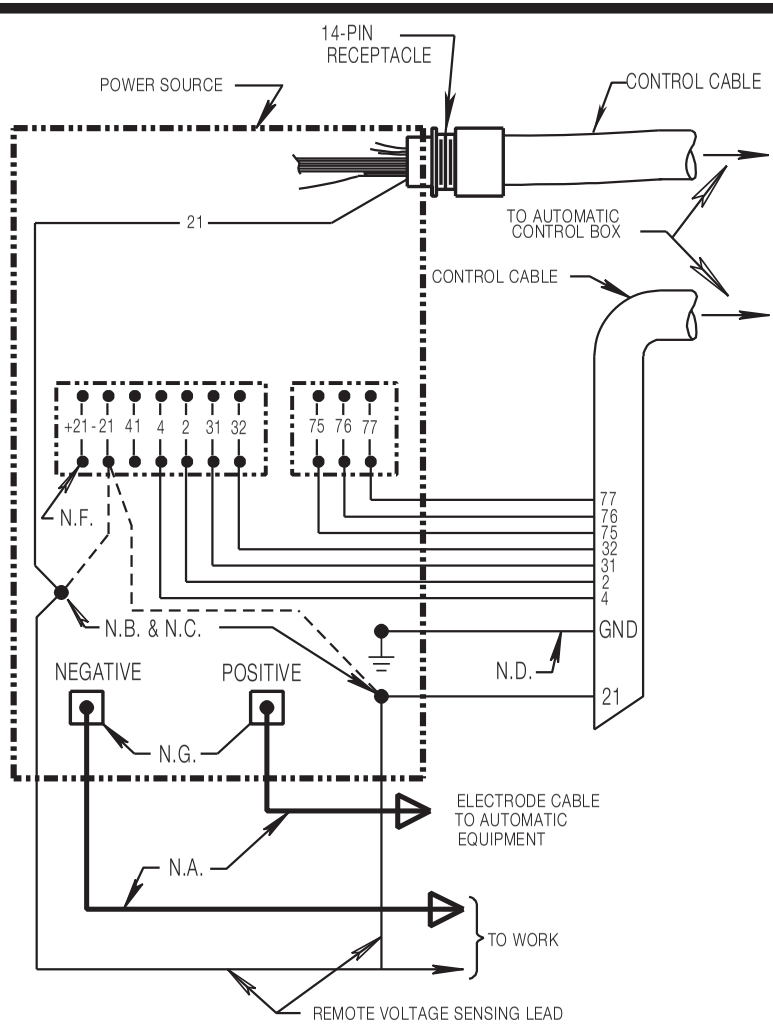
Above diagram shows electrode connected positive. To change polarity, turn power off, reverse the electrode and work leads at the power source and position the switch on wire feeder (if equipped) to proper polarity. Also refer to note N.F.

For proper setting of switches on power source, see power source operating manual.

10-30-98F

S22977

CONNECTION OF NA-3, LT-5 OR LT-7 TO THE CV-655, DC-655 OR DC-600 POWER SOURCE



FOR CONTROL CABLE WITH 14 PIN MS-TYPE PLUG CONNECTOR

OR

FOR CONTROL CABLE WITH TERMINAL STRIP LEAD CONNECTORS

WARNING

ELECTRIC SHOCK CAN KILL

- Do not operate with covers removed.
- Disconnect power source before servicing.
- Do not touch electrically live parts.
- Only qualified persons should install, use or service this machine.

N.A. Welding cables must be of proper capacity for the current and duty cycle of immediate and future applications.

N.B. Extend lead #21 from control cable with terminal strip connectors or from 14-pin receptacle using #14 AWG or larger insulated wire physically suitable for the installation. An S16586-[LENGTH] remote voltage sensing work lead may be ordered for this purpose. Connect it directly to the work piece keeping it electrically separate form the welding work lead circuit and connection. For convenience, this extended #21 lead should be taped to the welding work lead. (If the length of work lead circuit is short, and connections can be expected to be reliable, then control cable lead #21 does not need to be extended and can be directly connected to terminal #21 on the terminal strip. Note that this is not the preferred connection because it adds error to the wire feeder voltmeter reading.)

N.C. Tape up bolted connection if lead #21 is extended.

N.D. Connect the control cable ground lead to the frame terminal marked ⏚ near the power source terminal strip. The power source grounding terminal (marked ⏚ and located near the power source input power connections) must be properly connected to electrical ground per the power source operating manual.

N.E. If a variable voltage board is present in the automatic controls, the jumper lead on the VV board must be connected to pin "L" to permit the inch down button to operate. This jumper, however, will disable the cold starting/autostop feature of the automatic controls, permitting only hot starting techniques to be used.

N.F. If lead #21 is to be connected to the terminal strip, connect to the #21 terminal that matches work polarity. This connection must be changed whenever the electrode polarity is changed.

N.G. Illustration does not necessarily represent actual position of appropriate output studs. Refer to power source operating manual for more information.

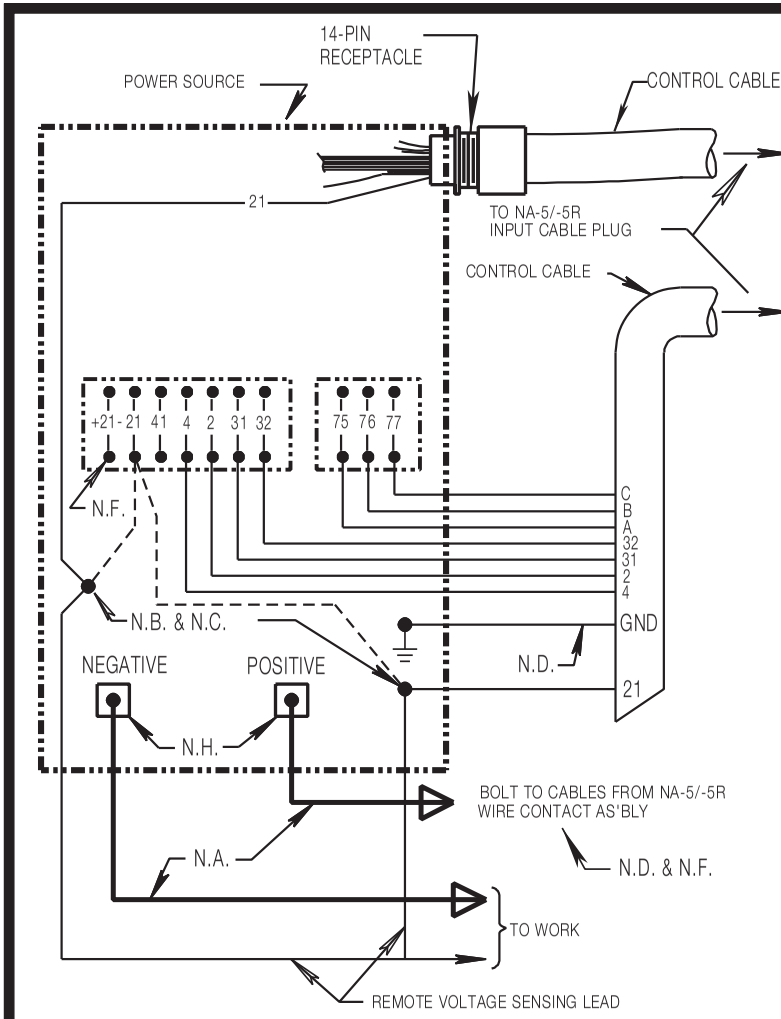
Above diagram shows electrode connected positive. To change polarity, turn power off, reverse the electrode and work leads at the power source. Reverse the leads on the back of the ammeter and voltmeter in the automatic control box. Also refer to note N.F.

For proper setting of switches on power source, see power source operating manual.

10-30-98F

S22978

CONNECTION OF NA-5/-5R TO THE CV-655, DC-655 OR DC-600 POWER SOURCE



FOR CONTROL CABLE WITH 14 PIN MS-TYPE PLUG CONNECTOR

OR

FOR CONTROL CABLE WITH TERMINAL STRIP LEAD CONNECTORS

WARNING

ELECTRIC SHOCK CAN KILL

- Do not operate with covers removed.
- Disconnect power source before servicing.
- Do not touch electrically live parts.
- Only qualified persons should install, use or service this machine.

N.A. Welding cables must be of proper capacity for the current and duty cycle of immediate and future applications.

N.B. Extend lead #21 from control cable with terminal strip connectors or from 14-pin receptacle using #14 AWG or larger insulated wire physically suitable for the installation. An S16586-[LENGTH] remote voltage sensing work lead may be ordered for this purpose. Connect it directly to the work piece keeping it electrically separate from the welding work lead circuit and connection. For convenience, this extended #21 lead should be taped to the welding work lead. (If the length of work lead circuit is short, and connections can be expected to be reliable, then control cable lead #21 does not need to be extended and can be directly connected to terminal #21 on the terminal strip. Note that this is not the preferred connection because it adds error to the NA-5/-5R voltmeter reading.)

N.C. Tape up bolted connection if lead #21 is extended.

N.D. Connect the control cable ground lead to the frame terminal marked ⏚ near the power source terminal strip. The power source grounding terminal (marked ⏚ and located near the power source input power connections) must be properly connected to electrical ground per the power source operating manual.

N.E. The jumpers on the NA-5/-5R voltage board must be connected as follows:
Connect red jumper to pin "S".
Connect white jumper to pin "B".
When using NA-5/-5R controls above Code 8300, the NA-5/-5R Inch Down button will not operate unless a jumper is connected between the two tab terminals, labeled "AUTO", located above the transformer on the NA-5/-5R Voltage P.C. board. This jumper, however, will disable the Cold Starting/Auto-Stop/Touching-Work feature of the NA-5/-5R, permitting only Hot Starting techniques to be used.

N.F. If lead #21 is to be connected to the terminal strip, connect to the #21 terminal that matches work polarity. This connection must be changed whenever the electrode polarity is changed.

N.G. For proper NA-5/-5R operation, the electrode cables must be snugged under the clamp bar on the left side of the NA-5/-5R control box.

N.H. Illustration does not necessarily represent actual position of appropriate output studs. Refer to power source operating manual for more information.

Above diagram shows electrode connected positive. To change polarity, turn power off, reverse the electrode and work leads at the power source.

Refer to NA-5 or NA-5R Operating Manual for required NA-5 or NA-5R control box polarity connections. Also refer to note N.F.

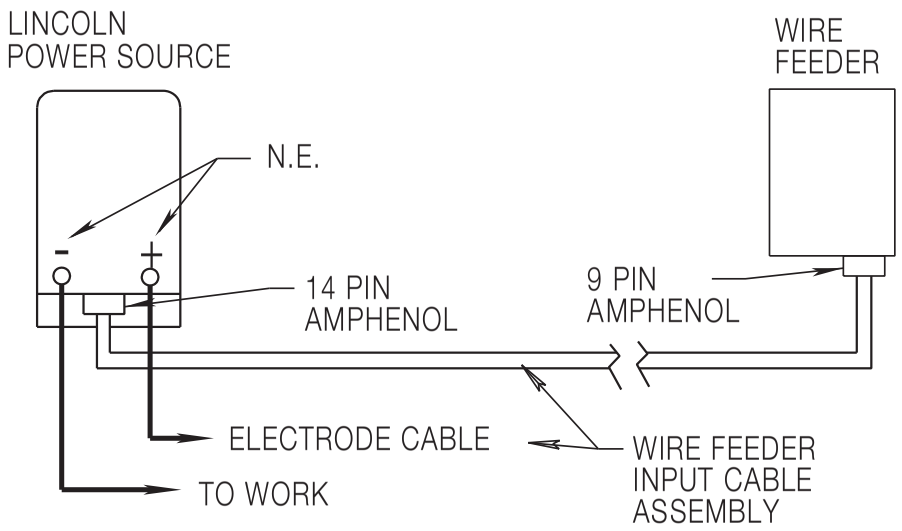
FOR ADDITIONAL INSTALLATION INSTRUCTIONS, SEE NA-5 OR NA-5R OPERATING MANUAL.

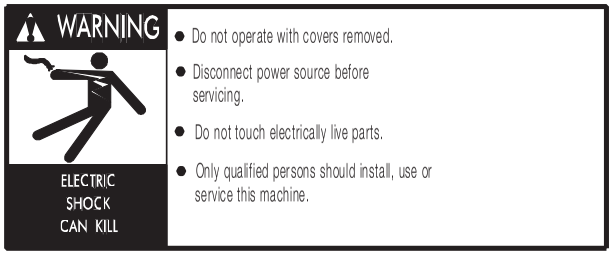
For proper setting of switches on power source, see power source operating manual.

10-30-98F

S22979

CONNECTION OF DH-10 OR LN-10 TO POWER SOURCE WITH 14 PIN AMPHENOL




WARNING
ELECTRIC
SHOCK
CAN KILL
Do not operate with covers removed.
Disconnect power source before servicing.
Do not touch electrically live parts.
Only qualified persons should install, use or service this machine.

N.A. WELDING CABLE MUST BE SIZED FOR CURRENT AND DUTY CYCLE OF APPLICATION.

N.B. DIAGRAM SHOWS ELECTRODE POSITIVE. TO CHANGE POLARITY, TURN POWER "OFF", REVERSE ELECTRODE AND WORK CABLES AT POWER SOURCE.

N.C. PINS NOT LISTED ARE NOT CONNECTED ON CABLE.

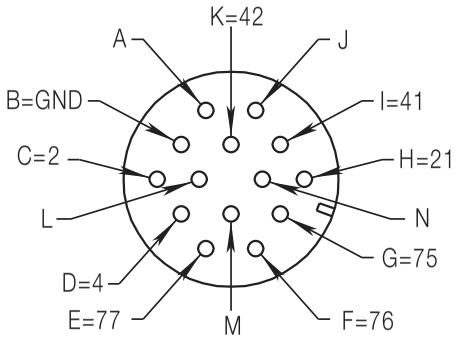
N.D. IF LEAD #21 IS TO BE CONNECTED TO THE TERMINAL STRIP, CONNECT TO THE #21 TERMINAL THAT MATCHES WORK POLARITY. THIS CONNECTION MUST BE CHANGED WHENEVER THE ELECTRODE POLARITY IS CHANGED.

N.E. ILLUSTRATION DOES NOT NECESSARILY REPRESENT ACTUAL POSITION OF APPROPRIATE OUTPUT STUDS. REFER TO POWER SOURCE OPERATING MANUAL FOR MORE INFORMATION.

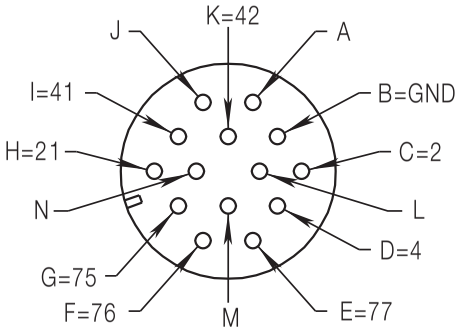
FOR PROPER SETTINGS OF SWITCHES ON POWER SOURCE, SEE POWER SOURCE OPERATING MANUAL.

FUNCTIONS ARE LISTED FOR REFERENCE ONLY AND EACH MAY OR MAY NOT BE PRESENT IN YOUR EQUIPMENT.
(SEE APPROPRIATE WIRING DIAGRAM)

PIN	LEAD	FUNCTION
B	GND	CHASSIS CONNECTION
C	2	TRIGGER CIRCUIT
D	4	TRIGGER CIRCUIT
E	77	OUTPUT CONTROL
F	76	OUTPUT CONTROL
G	75	OUTPUT CONTROL
H	21	WORK
I	41	42V AC
K	42	42V AC



14-SOCKET BOX RECEPTACLE, FRONT VIEW AND 14-PIN CABLE PLUG, REAR VIEW

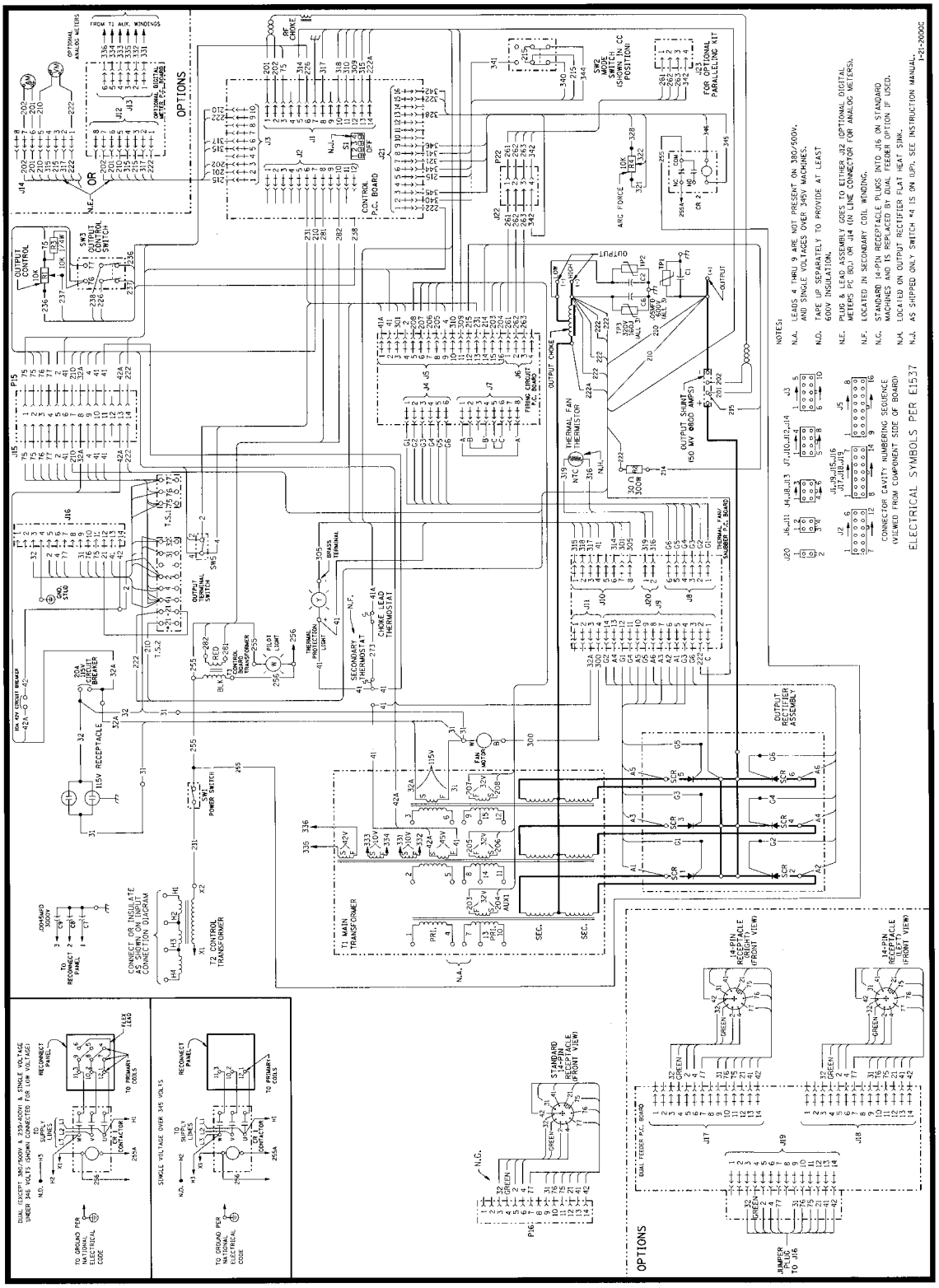


14-SOCKET BOX RECEPTACLE, REAR VIEW AND 14-PIN CABLE PLUG, FRONT VIEW

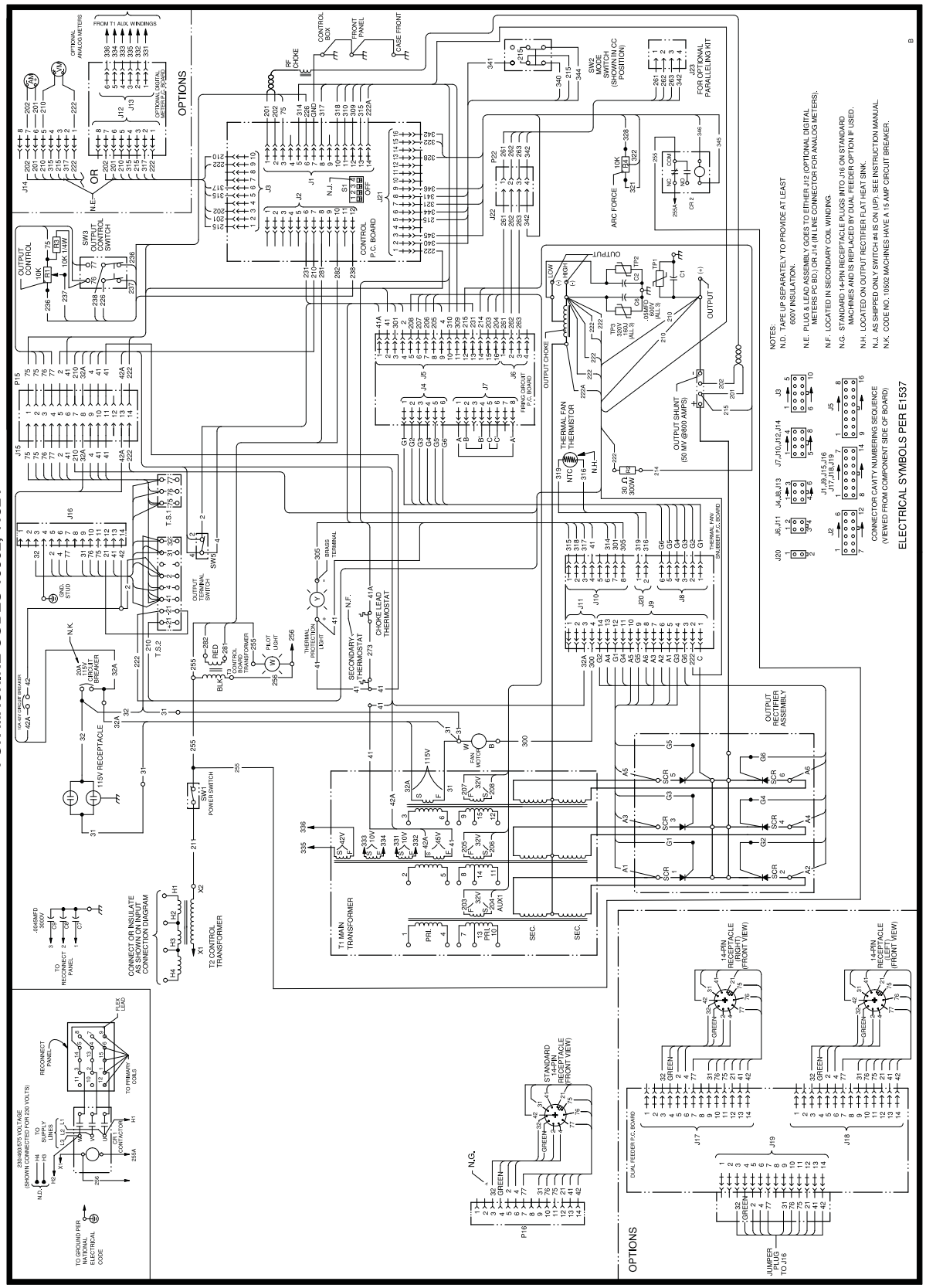
10-30-98F

S22980

WIRING DIAGRAM FOR CODES 10501,10503, 10504, 10505

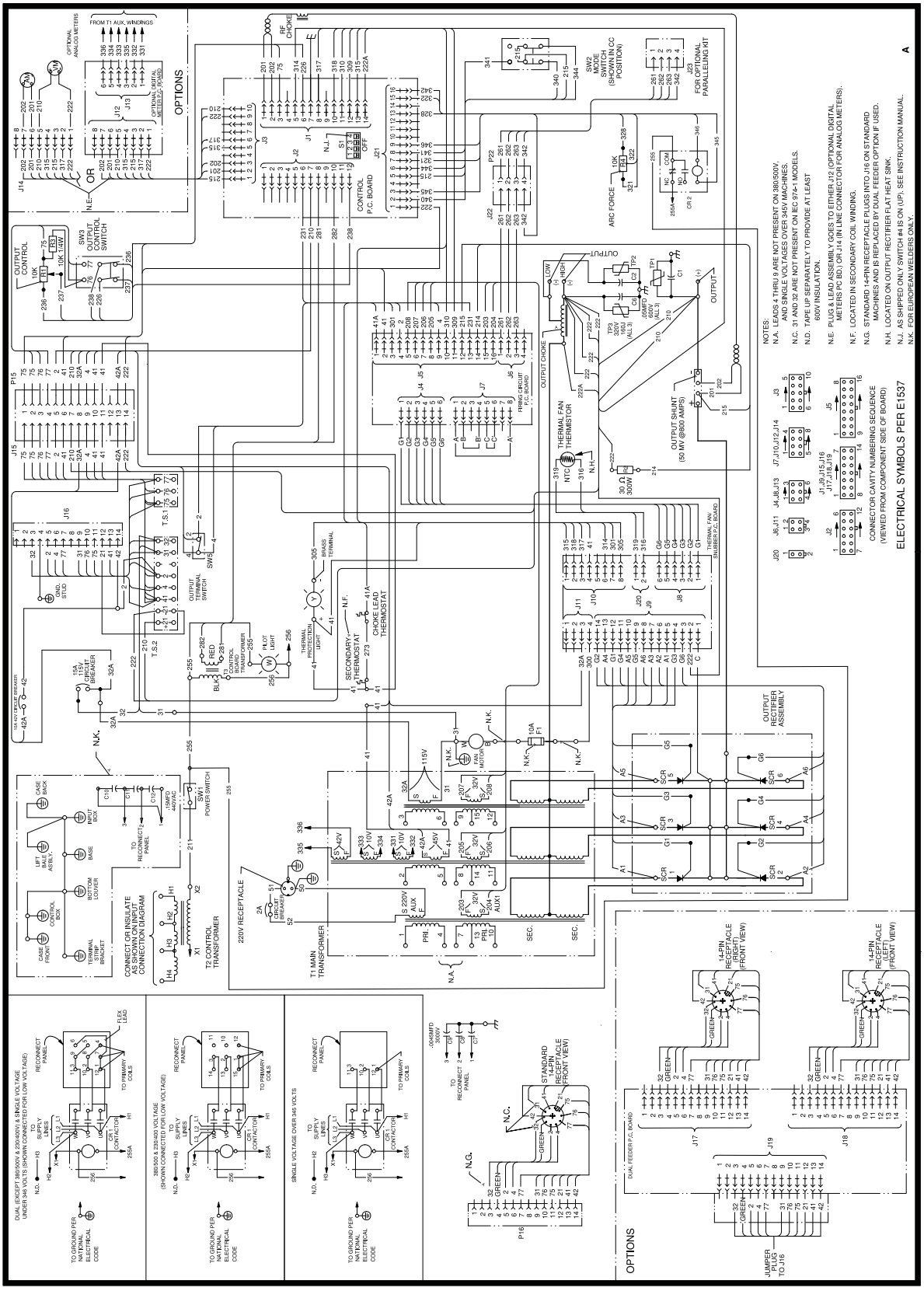

OPTIONS
OPTIONAL ANALOG METERS
OPTIONAL DIGITAL METER PC BOARD
OUTPUT CONTROL
SW3 OUTPUT CONTROL SWITCH
CONTROL P.C. BOARD
RF CHOKE
SW2 MODE SELECTOR SWITCH (SHOWN IN CC POSITION)
FOR OPTIONAL PARALLELING KIT
ARC FORCE
OUTPUT CHOKE
THERMAL FAN THERMISTOR
OUTPUT SHUNT 650 AMP 60MV
OUTPUT RECTIFIER ASSEMBLY
T1 MAIN TRANSFORMER
T2 CONTROL TRANSFORMER
SW1 POWER SWITCH
115V RECEPTACLE
220A HAN CIRCUIT BREAKER
OUTPUT TERMINAL SWITCH
CHOKE COIL 414 THERMOSTAT
CONTROL TRANSFORMER
PILOT LIGHT
THERMAL PROTECTION LIGHT
FAN MOTOR
CONNECT OR INSULATE AS SHOWN FOR DESIRED CONNECTION DIAGRAM
TO RECONNECT PANEL
DUAL (EXCEPT 380/500V & 230/400V & SINGLE VOLTAGE UNDER 345 VOLTS (SHOWN CONNECTED FOR LOW VOLTAGE)
SINGLE VOLTAGE OVER 345 VOLTS
TO GROUND PER NATIONAL ELECTRICAL CODE
RECONNECT PANEL
SUPPLY LINES
TO PRIMARY COILS
FLEX LEAD
CONTACTOR
STANDARD 14-PIN RECEPTACLE (FRONT VIEW)
14-PIN RECEPTACLE (FRONT VIEW)
DUAL FEEDER P.C. BOARD
JUMPER PLUG TO J16
OPTIONS
NOTES:
N.A. LEADS 4 THRU 9 ARE NOT PRESENT ON 380/500V AND SINGLE VOLTAGES OVER 345V MACHINES.
N.D. TAPE UP SEPARATELY TO PROVIDE AT LEAST 600V INSULATION.
N.E. PLUG & LEAD ASSEMBLY GOES TO EITHER J22 (OPTIONAL DIGITAL METERS PC BD.) OR J14 (IN LINE CONNECTOR FOR ANALOG METERS).
N.F. LOCATED IN SECONDARY COIL WINDING.
N.G. STANDARD 14-PIN RECEPTACLE PLUGS INTO J16 ON STANDARD MACHINES AND IS REPLACED BY DUAL FEEDER OPTION IF USED.
N.H. LOCATED ON OUTPUT RECTIFIER FLAT HEAT SINK.
N.J. AS SHIPPED ONLY SWITCH #4 IS ON (UP). SEE INSTRUCTION MANUAL.
ELECTRICAL SYMBOLS PER E1537
CONNECTOR CAVITY NUMBERING SEQUENCE (VIEWED FROM COMPONENT SIDE OF BOARD)
L21-2000C
G3348-1

This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels.

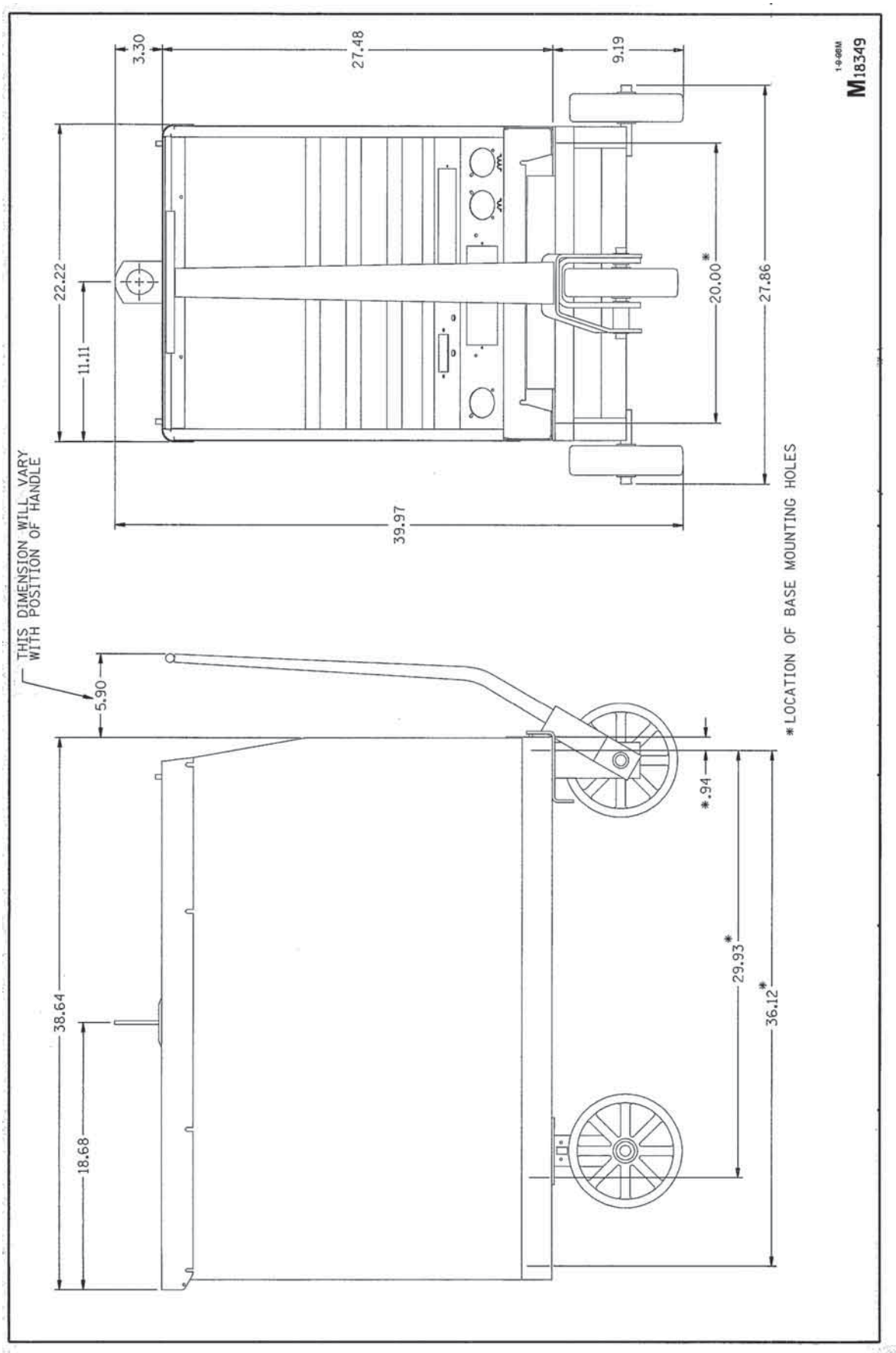

FOR MACHINE CODES 10502, 11324
G3348-2
ELECTRICAL SYMBOLS PER E1537
NOTES:
N.D. TAPE UP SEPARATELY TO PROVIDE AT LEAST 600V INSULATION.
N.E. PLUG & LEAD ASSEMBLY GOES TO EITHER J12 (OPTIONAL DIGITAL METERS PC BD.) OR J14 (IN LINE CONNECTOR FOR ANALOG METERS).
N.F. LOCATED IN SECONDARY COIL WINDING.
N.G. STANDARD 14-PIN RECEPTACLE PLUGS INTO J16 ON STANDARD MACHINES AND IS REPLACED BY DUAL FEEDER OPTION IF USED.
N.H. LOCATED ON OUTPUT RECTIFIER FLAT HEAT SINK.
N.J. AS SHIPPED ONLY SWITCH #4 IS ON (UP). SEE INSTRUCTION MANUAL.
N.K. CODE NO. 10502 MACHINES HAVE A 15 AMP CIRCUIT BREAKER.
CONNECTOR CAVITY NUMBERING SEQUENCE (VIEWED FROM COMPONENT SIDE OF BOARD)
OPTIONS
DUAL FEEDER P.C. BOARD
JUMPER PLUG TO J16
14-PIN RECEPTACLE (FRONT VIEW)
STANDARD 14-PIN RECEPTACLE (FRONT VIEW)
OUTPUT RECTIFIER ASSEMBLY
T1 MAIN TRANSFORMER
T2 CONTROL TRANSFORMER
CONNECT OR INSULATE AS SHOWN ON INPUT CONNECTION DIAGRAM
115V RECEPTACLE
POWER SWITCH
CONTROL P.C. BOARD
OUTPUT CONTROL
OUTPUT CONTROL SWITCH
OUTPUT TERMINAL SWITCH
THERMAL PROTECTION LIGHT
SECONDARY THERMOSTAT
CHOKE LEAD THERMOSTAT
PILOT LIGHT
FAN MOTOR
THERMAL FAN THERMISTOR
OUTPUT CHOKE
OUTPUT SHUNT (50 MV @600 AMPS)
ARC FORCE
SW2 MODE SWITCH (SHOWN IN CC POSITION)
RF CHOKE
FRONT PANEL
CASE FRONT
CONTROL BOX
OPTIONAL ANALOG METERS
OPTIONAL DIGITAL METERS (SHOWN)
FROM T1 AUX. WINDINGS
FOR OPTIONAL PARALLELING KIT
TO RECONNECT PANEL
RECONNECT PANEL
FLEX LEAD
TO PRIMARY COILS
230/460/575 VOLTAGE (SHOWN CONNECTED FOR 230 VOLTS)
SUPPLY LINES
CR1 CONTACTOR
TO GROUND PER NATIONAL ELECTRICAL CODE
N.J.
N.K.
N.H.
N.F.
N.G.
N.E.
N.D.

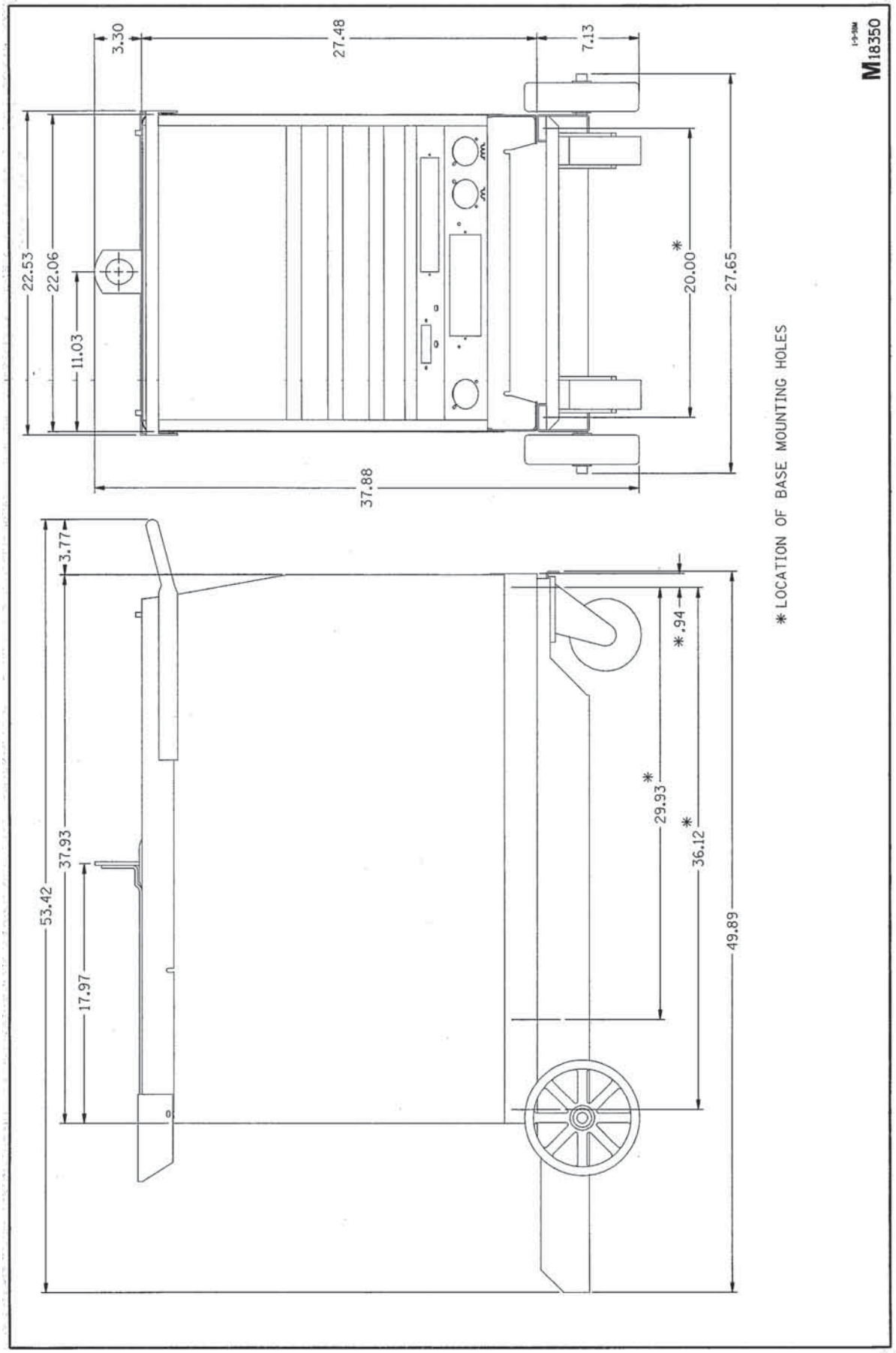
This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels.

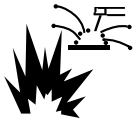
FOR MACHINE CODES 10506, 10507, 10508, 10509, 10510


DUAL (EXCEPT 380/500V & 230/460V) & SINGLE VOLTAGE
UNDER 346 VOLTS (SHOWN CONNECTED FOR LOW VOLTAGE)
380/500 & 230/460 VOLTAGE
(SHOWN CONNECTED FOR LOW VOLTAGE)
SINGLE VOLTAGE OVER 345 VOLTS
RECONNECT PANEL
TO PRIMARY COILS
TO GROUND PER NATIONAL ELECTRICAL CODE
T1 MAIN TRANSFORMER
T2 CONTROL TRANSFORMER
CONNECT OR INSULATE AS SHOWN ON INPUT CONNECTION DIAGRAM
220V RECEPTACLE
OPTIONS
OUTPUT RECTIFIER ASSEMBLY
OUTPUT CHOKE
THERMAL FAN THERMISTOR
OUTPUT SHUNT (50 MV @800 AMPS)
ARC FORCE
SW2 MODE SWITCH (SHOWN IN CC POSITION)
FOR OPTIONAL PARALLELING KIT
OUTPUT CONTROL
SW3 OUTPUT CONTROL SWITCH
OPTIONAL ANALOG METERS
OPTIONAL DIGITAL METERS P.C. BOARD
FROM T1 AUX. WINDINGS
CONTROL P.C. BOARD
DUAL FEEDER P.C. BOARD
STANDARD 14-PIN RECEPTACLE (FRONT VIEW)
14-PIN RECEPTACLE (RIGHT) (FRONT VIEW)
14-PIN RECEPTACLE (LEFT) (FRONT VIEW)
JUMPER TO J16
NOTES:
N.A. LEADS #'S THRU 9 ARE NOT PRESENT ON 380/500V, 230/460V OR SINGLE VOLTAGE OVER 345 VOLTS MACHINES.
N.C. 31 AND 32 ARE NOT PRESENT ON IEC 974-1 MODELS.
N.D. TAPE UP SEPARATELY TO PROVIDE AT LEAST 600V INSULATION.
N.E. PLUG & LEAD ASSEMBLY GOES TO EITHER J12 (OPTIONAL DIGITAL METERS PC BD.) OR J14 (IN LINE CONNECTOR FOR ANALOG METERS).
N.F. LOCATED IN SECONDARY COIL WINDING.
N.G. STANDARD 14-PIN RECEPTACLE PLUGS INTO J16 ON STANDARD MACHINES AND IS REPLACED BY DUAL FEEDER OPTION IF USED.
N.H. LOCATED ON OUTPUT RECTIFIER FLAT HEAT SINK.
N.J. AS SHIPPED ONLY SWITCH #4 IS ON (UP). SEE INSTRUCTION MANUAL.
N.K. FOR EUROPEAN WELDERS ONLY.
ELECTRICAL SYMBOLS PER E1537
CONNECTOR CAVITY NUMBERING SEQUENCE (VIEWED FROM COMPONENT SIDE OF BOARD)
G3348-3
A

This diagram is for reference only. It may not be accurate for all machines covered by this manual. The specific diagram for a particular code is pasted inside the machine on one of the enclosure panels.


M18349
3.30
27.48
9.19
22.22
11.11
20.00*
27.86
39.97
THIS DIMENSION WILL VARY WITH POSITION OF HANDLE
5.90
*.94
38.64
18.68
29.93*
36.12*
*LOCATION OF BASE MOUNTING HOLES


M18350
3.30
27.48
7.13
22.53
22.06
11.03
20.00
27.65
37.88
3.77
37.93
53.42
17.97
.94
29.93
36.12
49.89
* LOCATION OF BASE MOUNTING HOLES

			
WARNING	● Do not touch electrically live parts or electrode with skin or wet clothing. ● Insulate yourself from work and ground.	● Keep flammable materials away.	● Wear eye, ear and body protection.
Spanish **AVISO DE PRECAUCION**	● No toque las partes o los electrodos bajo carga con la piel o ropa mojada. ● Aislese del trabajo y de la tierra.	● Mantenga el material combustible fuera del área de trabajo.	● Protéjase los ojos, los oídos y el cuerpo.
French **ATTENTION**	● Ne laissez ni la peau ni des vêtements mouillés entrer en contact avec des pièces sous tension. ● Isolez-vous du travail et de la terre.	● Gardez à l'écart de tout matériel inflammable.	● Protégez vos yeux, vos oreilles et votre corps.
German **WARNUNG**	● Berühren Sie keine stromführenden Teile oder Elektroden mit Ihrem Körper oder feuchter Kleidung! ● Isolieren Sie sich von den Elektroden und dem Erdboden!	● Entfernen Sie brennbarres Material!	● Tragen Sie Augen-, Ohren- und Körperschutz!
Portuguese **ATENÇÃO**	● Não toque partes elétricas e electrodos com a pele ou roupa molhada. ● Isole-se da peça e terra.	● Mantenha inflamáveis bem guardados.	● Use proteção para a vista, ouvido e corpo.
Japanese **注意事項**	● 通電中の電気部品、又は溶材にヒフやぬれた布で触れないこと。 ● 施工物やアースから身体が絶縁されている様にして下さい。	● 燃えやすいものの側での溶接作業は絶対にしてはなりません。	● 目、耳及び身体に保護具をして下さい。
Chinese **警 告**	● 皮肤或濕衣物切勿接觸帶電部件及銲條。 ● 使你自己與地面和工件絶緣。	● 把一切易燃物品移離工作場所。	● 佩戴眼、耳及身體勞動保護用具。
Korean **위 험**	● 전도체나 용접봉을 젖은 헝겁 또는 피부로 절대 접촉치 마십시요. ● 모재와 접지를 접촉치 마십시요.	● 인화성 물질을 접근 시키지 마시요.	● 눈, 귀와 몸에 보호장구를 착용하십시요.
Arabic **تحذير**	● لا تلمس الاجزاء التي يسري فيها التيار الكهربائي أو الالكترود بجلد الجسم أو بالملابس المبللة بالماء. ● ضع عازلا على جسمك خلال العمل.	● ضع المواد القابلة للاشتعال في مكان بعيد.	● ضع أدوات وملابس واقية على عينيك وأذنيك وجسمك.

READ AND UNDERSTAND THE MANUFACTURER'S INSTRUCTION FOR THIS EQUIPMENT AND THE CONSUMABLES TO BE USED AND FOLLOW YOUR EMPLOYER'S SAFETY PRACTICES.

SE RECOMIENDA LEER Y ENTENDER LAS INSTRUCCIONES DEL FABRICANTE PARA EL USO DE ESTE EQUIPO Y LOS CONSUMIBLES QUE VA A UTILIZAR, SIGA LAS MEDIDAS DE SEGURIDAD DE SU SUPERVISOR.

LISEZ ET COMPRENEZ LES INSTRUCTIONS DU FABRICANT EN CE QUI REGARDE CET EQUIPMENT ET LES PRODUITS A ETRE EMPLOYES ET SUIVEZ LES PROCEDURES DE SECURITE DE VOTRE EMPLOYEUR.

LESEN SIE UND BEFOLGEN SIE DIE BETRIEBSANLEITUNG DER ANLAGE UND DEN ELEKTRODENEINSATZ DES HERSTELLERS. DIE UNFALLVERHÜTUNGSVORSCHRIFTEN DES ARBEITGEBERS SIND EBENFALLS ZU BEACHTEN.

● Keep your head out of fumes. ● Use ventilation or exhaust to remove fumes from breathing zone.	● Turn power off before servicing.	● Do not operate with panel open or guards off.	**WARNING**
● Los humos fuera de la zona de respiración. ● Mantenga la cabeza fuera de los humos. Utilice ventilación o aspiración para gases.	● Desconectar el cable de alimentación de poder de la máquina antes de iniciar cualquier servicio.	● No operar con panel abierto o guardas quitadas.	Spanish **AVISO DE PRECAUCION**
● Gardez la tête à l'écart des fumées. ● Utilisez un ventilateur ou un aspirateur pour ôter les fumées des zones de travail.	● Débranchez le courant avant l'entretien.	● N'opérez pas avec les panneaux ouverts ou avec les dispositifs de protection enlevés.	French **ATTENTION**
● Vermeiden Sie das Einatmen von Schweibrauch! ● Sorgen Sie für gute Be- und Entlüftung des Arbeitsplatzes!	● Strom vor Wartungsarbeiten abschalten! (Netzstrom völlig öffnen; Maschine anhalten!)	● Anlage nie ohne Schutzgehäuse oder Innenschutzverkleidung in Betrieb setzen!	German **WARNUNG**
● Mantenha seu rosto da fumaça. ● Use ventilação e exhaustão para remover fumo da zona respiratória.	● Não opere com as tampas removidas. ● Desligue a corrente antes de fazer serviço. ● Não toque as partes elétricas nuas.	● Mantenha-se afastado das partes moventes. ● Não opere com os paineis abertos ou guardas removidas.	Portuguese **ATENÇÃO**
● ヒュームから頭を離すようにして下さい。 ● 換気や排煙に十分留意して下さい。	● メンテナンス・サービスに取りかかる際には、まず電源スイッチを必ず切って下さい。	● パネルやカバーを取り外したままで機械操作をしないで下さい。	Japanese **注意事項**
●頭部遠離煙霧。 ●在呼吸區使用通風或排風器除煙。	●維修前切斷電源。	●儀表板打開或沒有安全罩時不準作業。	Chinese **警 告**
● 얼굴로부터 용접가스를 멀리하십시요. ● 호흡지역으로부터 용접가스를 제거하기 위해 가스제거기나 통풍기를 사용하십시요.	● 보수전에 전원을 차단하십시요.	● 판넬이 열린 상태로 작동치 마십시요.	Korean **위 험**
● ابعد رأسك بعيداً عن الدخان. ● استعمل التهوية أو جهاز ضغط الدخان للخارج لكي تبعد الدخان عن المنطقة التي تتنفس فيها.	● اقطع التيار الكهربائي قبل القيام بأية صيانة.	● لا تشغل هذا الجهاز اذا كانت الاغطية الحديدية الواقية ليست عليه.	Arabic **تحذير**

LEIA E COMPREENDA AS INSTRUÇÕES DO FABRICANTE PARA ESTE EQUIPAMENTO E AS PARTES DE USO, E SIGA AS PRÁTICAS DE SEGURANÇA DO EMPREGADOR.

使う機械や溶材のメーカーの指示書をよく読み、まず理解して下さい。そして貴社の安全規定に従って下さい。

請詳細閱讀並理解製造廠提供的説明以及應該使用的銀焊材料，並請遵守貴方的有関勞動保護規定。

이 제품에 동봉된 작업지침서를 숙지하시고 귀사의 작업자 안전수칙을 준수하시기 바랍니다.

اقرأ بتمعن وافهم تعليمات المصنع المنتج لهذه المعدات والمواد قبل استعمالها واتبع تعليمات الوقاية لصاحب العمل.

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